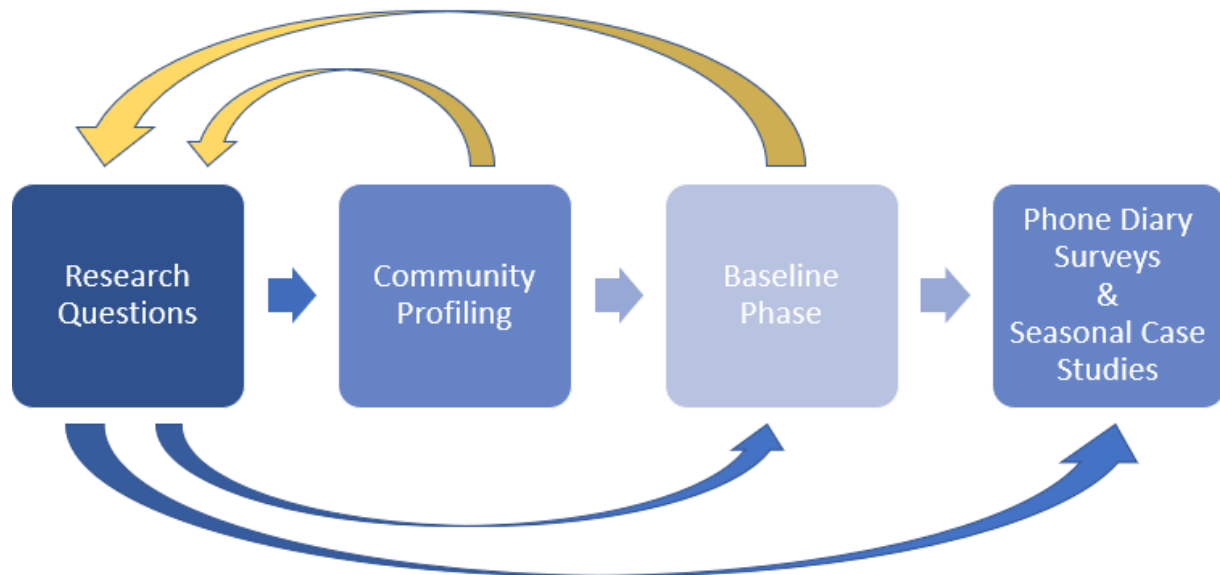


## Annex 1. Methodology and Fieldwork

The Afghanistan Household and Enterprise Energy Diaries study commenced in late 2017. During the inception phase, community profiles were conducted in each of the 30 sampled communities. The methodological framework was subsequently refined, and the major Baseline Data Collection round was conducted in April and May 2018. The call center panel diary surveys commenced in July 2018, lasting for 12 months (concluding in June 2019). Four seasonal case study rounds were also conducted over this year long period.

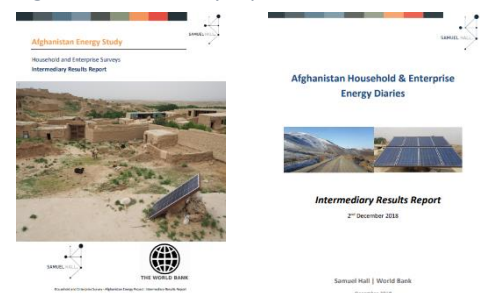
The study employed a phased, mixed methodological approach. This primarily consisted of large-scale quantitative survey data at the baseline phase and the panel phone diaries phase, building on and into qualitative research components including a community profiling exercise, focus group discussions and seasonal case studies.

*Figure 1 Data collection phases*



Two intermediary reports provided summary updates on the study for the World Bank, one following the Baseline Phase in August 2018 and one in December 2018 with an update on the progress of the call center and seasonal case studies.

*Figure 2 Intermediary reports*



## A. Sampling

The five sample provinces represented the different categories of electrification characteristics (with Herat being placed in the fourth category of being connected to Iran):

*Figure 3 Province selection*

Electrification rates	Provinces
<b>Highest</b>	<b>Kabul</b> , Balkh, Kandahar, Kunduz (and Herat)
<b>Expected to grow</b>	Badakhshan, Baghlan, Faryab, Helmand, Jowzjan, Laghman, Nangarhar, Parwan, <b>Samangan</b> , Sar-e-Pol, Takhar, and Wardak.
<b>Connection to the grid possible</b>	Badghis, Bamyan, Ghazni, Ghor, Kapisa, Khost, Kunar, Logar, <b>Paktia</b> , Paktika Panjshir, Uruzgan, and Zabul
<b>Connected to Iran</b>	Nimruz, <b>Herat</b>
<b>Off-grid solutions</b>	Nuristan, <b>Daykundi</b> , Fayab

The participant communities were selected to represent urban and rural locations, cover different districts in the provinces and were stratified random to fulfil these first two categories, along with communities deemed accessible after security assessments.

During the course of the study, 3061 households took part in the study, 179 businesses and 74 community institutions. These research participants covered a broad span of characteristics and experiences.

*Figure 4 Target sample numbers*

	Kabul	Samangan	Herat	Daikundi	Paktia	Total
Communities	6	6	6	6	6	30
Household surveys	600	600	600	600	600	3,000
Business and enterprise surveys	50	50	50	50	50	50
Focus groups (men/women/businesses)	6	6	6	6	6	30

## Households

Within these communities, households were surveyed randomly through a grid approach. Field team leaders, with the assistance of the community focal points, would map the community and divide it into a grid (taking into account population density in both densely populated urban areas and sparsely populated rural zones).

*Figure 5 GPS coordinates of households interviewed in Ghaf, Daikundi*



Based on this improvised map, enumeration areas were chosen and enumerators dispatched with a goal to having each enumerator cover approximately the same size of population. Within their grid, enumerators were encouraged to attempt to interview the inhabitants of every third dwelling.

## Business Enterprise and Community Institutions

A wide range of businesses and community institutions with distinct energy usage patterns were surveyed across all five provinces in purposive selections. While some rural communities in the sample (such as Qarya Dasht in Daikundi), were almost entirely agrarian and only had a few small retail shops, many communities had a broad span of home-enterprises, mobile-vending and more traditional businesses that engaged with energy in disparate and sometimes novel ways.<sup>1</sup>

The sampling was designed to cover major sources of economic growth in different contexts in the sample provinces. It was also designed to explore energy access issues, productive energy load, the potential for scaling up business activity in the event of improved energy access, etc. This range of enterprises and their varying tools; from ice-cream making machines, lathes, computers, to chicken coop equipment, provide an impression of the drivers of the Afghan economy in 2018.

The fieldwork was conducted in a compressed time period to mitigate deleterious effects of seasonality, including changes in daylight hours, weather and temperature. The deliberate choice in the stagger of the provinces meant that a shortened overall time frame could attenuate seasonality while still ensuring the highest quality data collection across the different provinces.

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<sup>1</sup> Examples include an embroiderer in Daikundi who used a solar home system to power her sewing machine. A barber in Shewaki, Kabul Province used a large wooden boiling system to provide hot showers and baths to patrons for a fee.

## B. Fieldwork and team

**Field teams** were comprised of local enumerators in every province, except in Daikundi which was covered by the Kabul team. The Field teams were trained and managed by Samuel Hall Field Coordinators. Two Team Leaders supported field coordinators and oversaw the teams in every province.

*Figure 6 Survey in Shewaki, Kabul Province. Interviewee on the left, enumerator on the right, middle a supervisor is sitting in on the survey.*



### Community Focal Points

The Community Focal Points were initially brought on board to liaise with participant communities over the year-long longitudinal part of the study and prevent attrition. However, the Focal Points proved to be a strong asset throughout the baseline phase. They provided on-the-ground knowledge of the geographical and human terrain of their respective communities. When walking with enumerators on their random sampling, a member of the community would open the door to a trusted member of the area who would help explain the research and its purpose. Across all 30 villages and urban areas, Community Focal Points could point out community institutions and small businesses, as well as locating other members of the community that the field-teams could speak to in order to gain a better understanding of the energy context of the area. The contribution by the Focal Points in the baseline phase augured well for their role as a key liaison with the research communities during the longitudinal phone surveys as well as the qualitative seasonal case studies.

The qualitative and quantitative data collection was complemented by Field Key Informant Interviews (KIIs), conducted by project research staff and the Field Coordinators. A range of actors were contacted to provide qualitative depth and a local but broader perspective on the energy landscape in a particular district or province. This included interviews with local DABS representatives, government officials, civil society organisation staff and electricity generation hardware vendors (such as solar home system sellers).

## Annex 2: Willingness to pay calculation method

### Introduction

One of the goals of the current study is to try to understand households' willingness to pay a fixed price for a given product or service. Otherwise formulated, we wish to elucidate the demand curve for various goods and services, i.e. how many households might purchase or adopt a given product or service if offered it at a given price. The goods and services under consideration in the current context are:

- a permanent connection to the electrical grid in exchange for a one time fee
- a permanent connection to the electrical grid in exchange for recurring payments over six months
- a solar home system, rented for a monthly fee
- a solar home system, purchased outright
- a single solar lantern, purchased outright

Because we consider each of these products to be of non-negligible interest to a vast majority of the population under study, we consider the demand to be the degree of penetration (i.e. the proportion of the population that would adopt the product or service) that might be achieved by offering that product or service at a given price.

We consider the domain of hypothetical prices that might be on offer under subsidy by a government, a charity or an international organization. For each product/service, we consider prices between zero and an estimate of what the unsubsidized cost of the product/service might be were it to become available in the respondent's community.

### Methodology

During the course of the baseline study, and for each of the applicable products/services above, each respondent was asked whether (s)he would be willing to pay a certain amount for that product/service. The amount proposed to each respondent was randomly drawn from a uniform distribution between nil and the unsubsidized cost of the product/service. Prices for each product/service were drawn independently, so that, for example, the price offered for a grid connection paid for up front was uncorrelated to the price offered for the same connection paid off monthly over six months (a "layaway").

Several months later, the same respondents were asked to indicate whether they would be willing to pay a second amount for each of the first two services offered: connection to the grid up front and on layaway. The prices offered in this round depended on the amount offered and the response given during the previous round:

If the respondent had previously responded in the affirmative, (s)he was proposed a higher amount randomly drawn between the previous amount and the unsubsidized amount.

If (s)he had previously responded in the negative, (s)he was now proposed a lower lower amount between nil and the previous amount. In this way, the range of possible adoption price-points was narrowed with each successive round.

## Analysis

Considering the prices offered in the first round and the distribution of the responses, we can have a first look at the relationship between price and demand. For the first service, connection to the grid for a fee, we see a preponderance of affirmatives with a weak relationship to price.



Because most respondents answered in the affirmative, the second round of offers tended to be much higher with a concomitant increase in correlation, as price points are more narrowly bracketed.



#### *Bounds on the demand curve*

Although the information collected was not sufficient to determine the maximum price at which a respondent would elect to adopt the service, it does allow us to bracket this price point given the following assumptions:

- If the respondent is unwilling to pay a price  $p$ , she will be unwilling to pay any price greater than  $p$ .
- If the respondent is willing to pay a price  $p$ , she will be willing to pay any price less than  $p$

This allows us to make some generalizations on limiting values of the demand curve as a function of the price offered. For every price  $p$  between nil and the unsubsidized price, we can calculate four values:

- A. the number of respondents who were offered less than  $p$  and declined
- B. the number of respondents who were offered more than  $p$  and accepted
- C. the number of respondents who were offered less than  $p$  and declined
- D. the number of respondents who were offered more than  $p$  and accepted

These four numbers can be calculated for any value of  $p$ . Consider the calculation at price  $p = 4400$  for a grid connection, paid up front.



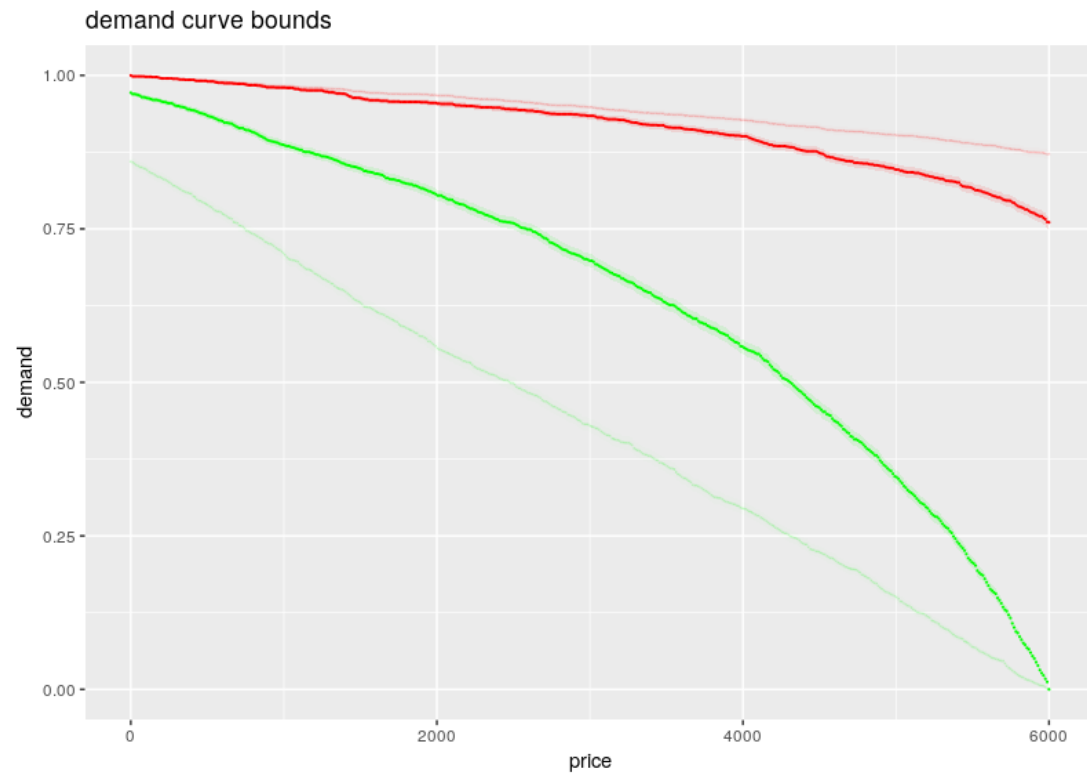


Here we find the following values:

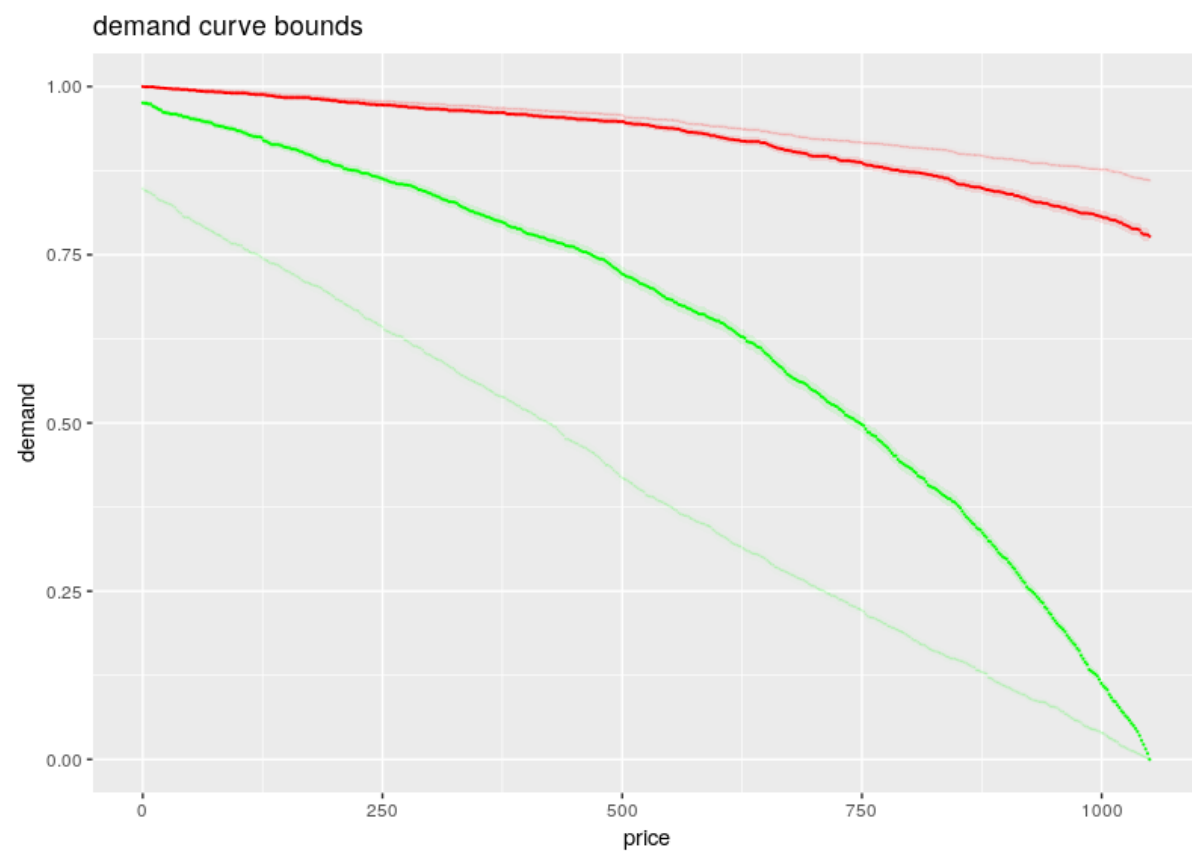
- 695 respondents were proposed a price below 4400 and accepted. We cannot determine whether they would accept an offer of 4400.
- 787 respondents were proposed a price above 4400 and accepted. We assume they would also accept a price of 4400. Thus, if our sample population represents our target population, at least 44% would accept a price of 4400.
- 92 respondents were offered a price below 4400 and declined. We assume they would also decline the price of 4400. Thus at least 5% would decline a price of 4400, meaning at that price, our demand (penetration) would be less than 95% of the population.
- 147 respondents were offered a price above 4400 and declined. Again, we cannot determine whether these respondents would accept a price of 4400.

Repeating these calculations for every price between nil and the unsubsidized price, we can use the proportion of respondents falling into groups B and C to calculate the minimum and maximum penetration (demand) for each price  $p$ . Here the fainter outer bounds show the maximum and minimum penetration revealed in the first round. The second round results bracket respondents' true cutoff demand more closely, yielding a tighter spread. Subsequent rounds of proposed prices would doubtless result in further tightening of the maximum-minimum spread.

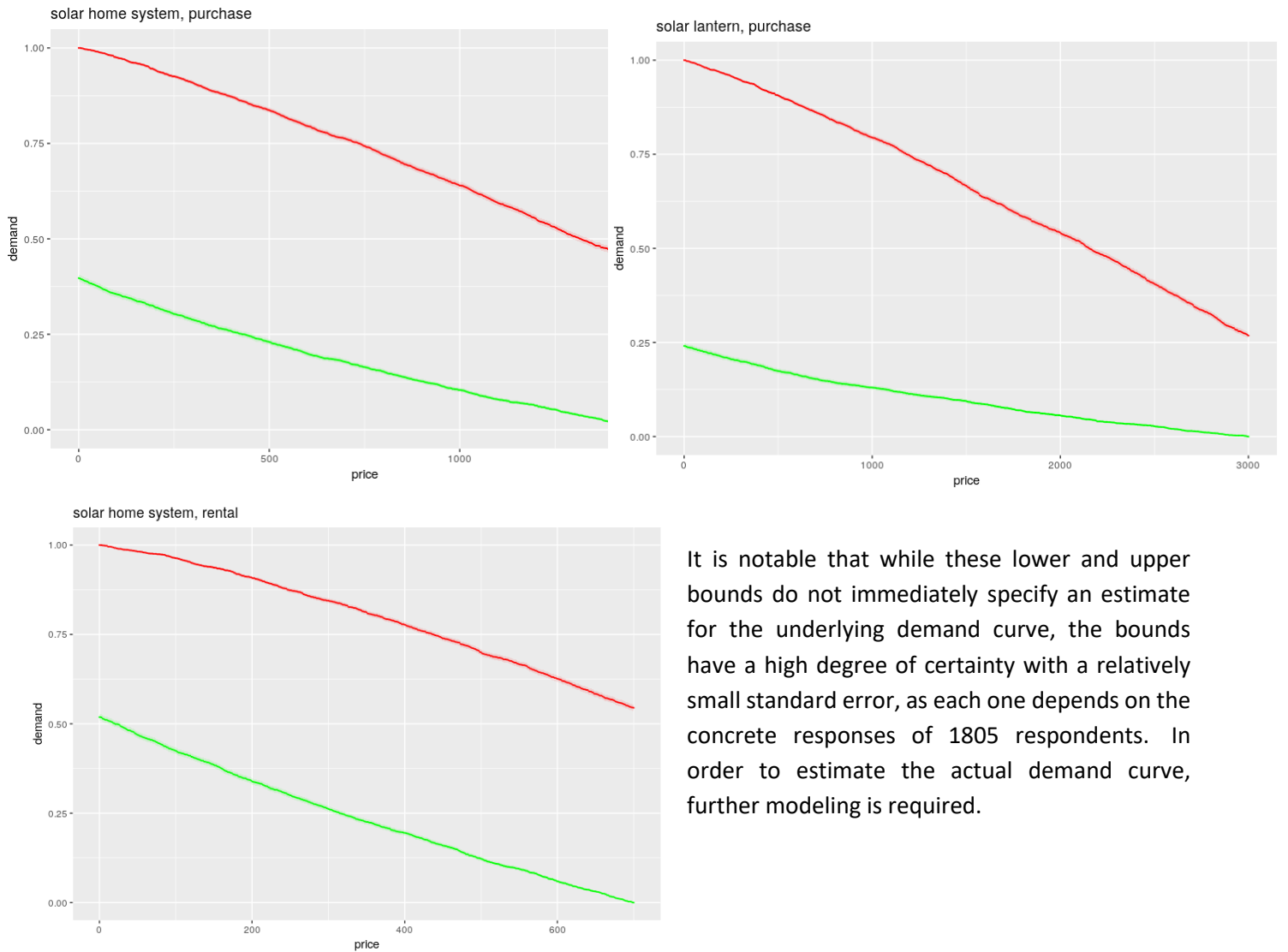




Similar results can be seen in the bounds on willingness to pay for a grid connection over six months:



Other products and services only got a single round of treatment, and thus wider bounds.



It is notable that while these lower and upper bounds do not immediately specify an estimate for the underlying demand curve, the bounds have a high degree of certainty with a relatively small standard error, as each one depends on the concrete responses of 1805 respondents. In order to estimate the actual demand curve, further modeling is required.

### *Estimating the cutoff point*

In the context of this analysis, we consider willingness to pay to be a binary variable indexed on the respondent and a function of price

$$w_i(p) = \begin{cases} 0 & \text{respondent } i \text{ is not willing to pay } p \\ 1 & \text{respondent } i \text{ is willing to pay } p \end{cases}$$

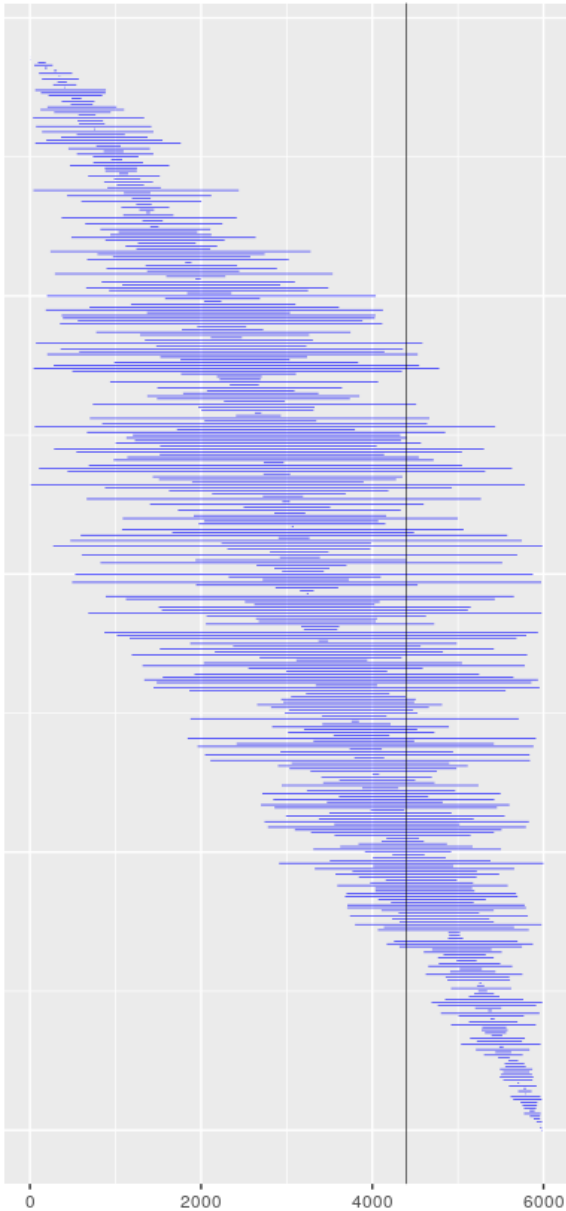
These are the values that are directly observed in the survey. In order to estimate the demand curve  $D(p)$ , we first need to model the cutoff price  $p_i^*$  for which

$$w_i(p) = \begin{cases} 0 & p > p_i^* \\ 1 & p < p_i^* \end{cases}$$

For respondents who have both declined an offered price  $p_i^{\text{hi}}$  and accepted a (lower) offered price  $p_i^{\text{lo}}$ , we can deduce that  $p_i^{\text{lo}} < p_i^* < p_i^{\text{hi}}$ . Of course, at least two values need to have been proposed in order to get one yes and one no, which means those questions that were only asked in the baseline do not qualify for this treatment.

Of these response intervals, some are wider than others, and some are closer to the top of the domain than others. The ranges of the 387 respondents with explicitly bounded cutoff prices for grid connection in a single payment are shown below.

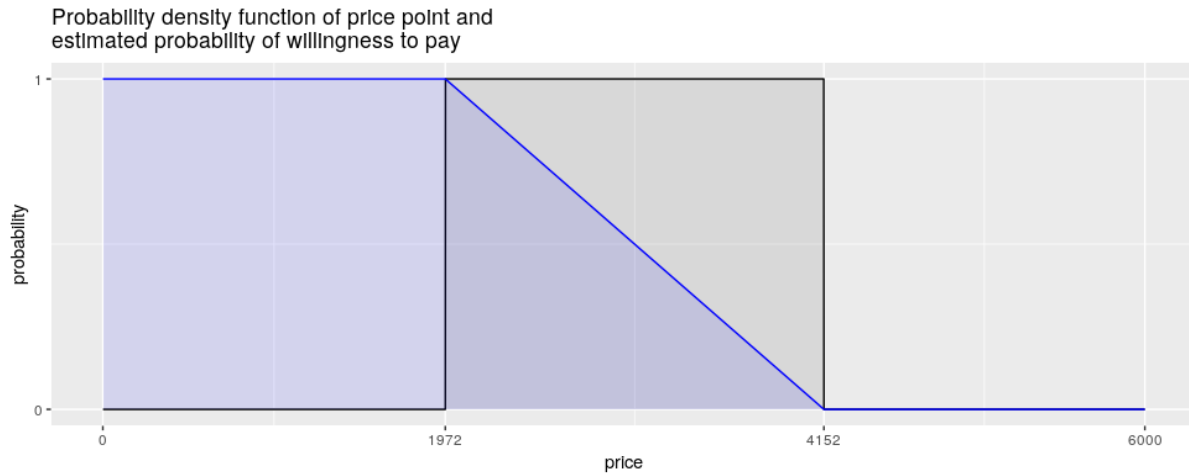
WTP range for each respondent



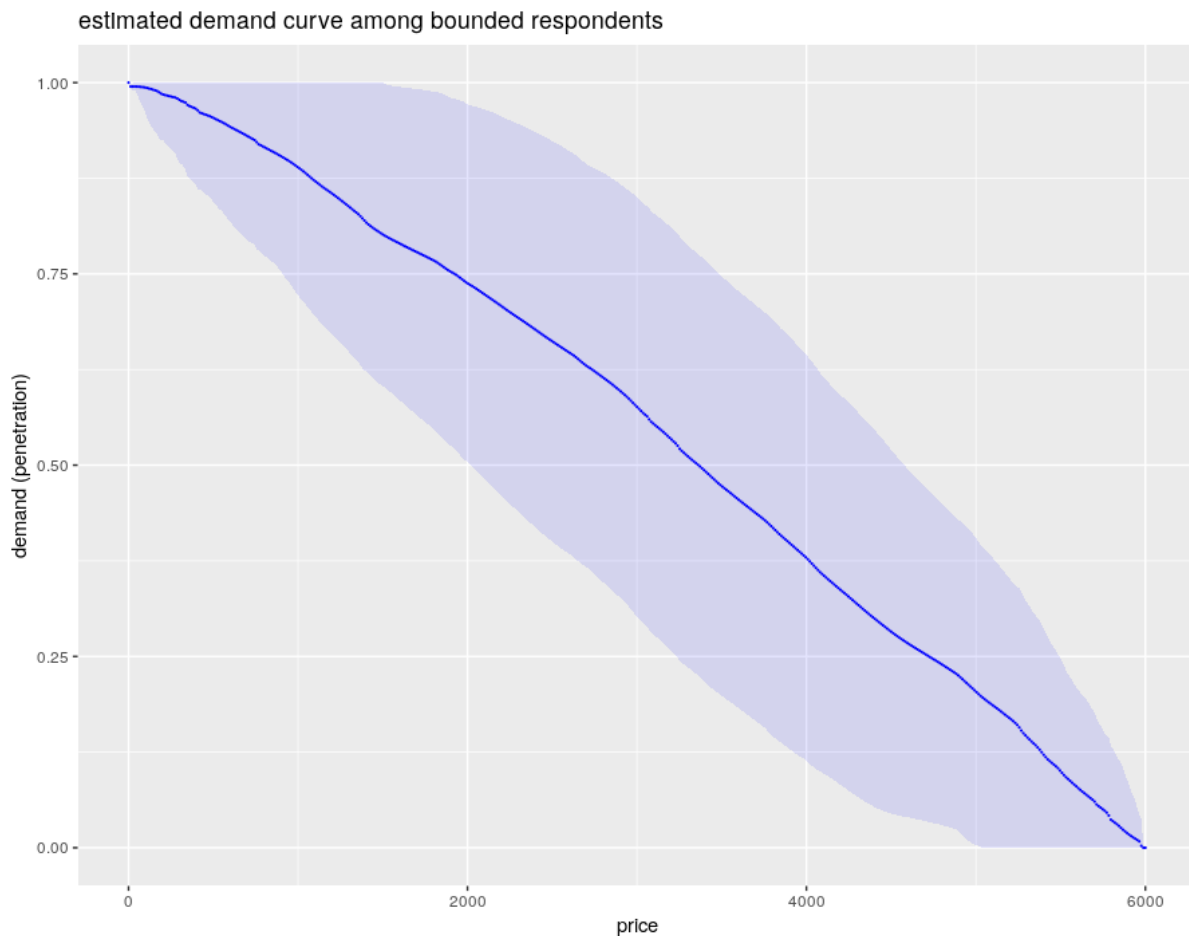
Considering again the price of 4400 AFG for a one time payment for connection to the grid, we see that for a few hundred respondents at the top, the range of  $p^*$  is entirely below 4400. These would certainly decline the offer. In contrast, a number of respondents near the bottom have  $p^*$  ranges entirely above 4400. These respondents would certainly accept.

For those respondents whose  $p^*$  range intersects the 4400 line, there is some probability they will accept. Given the strict range of  $p_i^*$  for each  $i$ , it is reasonable to assume that  $p_i^*$  is distributed uniformly in the interval  $[p_i^{\text{lo}}, p_i^{\text{hi}})$ .

For example, one respondent indicated in the first round that he would not be willing to pay 4152 AFG for a grid connection, but subsequently indicated that he would be willing to pay 1972. Modeling  $p^*$  as a uniformly distributed random variable on the interval  $[1972, 4152)$  (black curve), we find the expected value of  $w(p)$ , i.e. the probability that the respondent accepts an offer  $p$ , for this respondent (blue curve).



Repeating the procedure over all respondents with bounded cutoffs (those who have accepted and declined an offer), we can estimate the demand among this cohort:



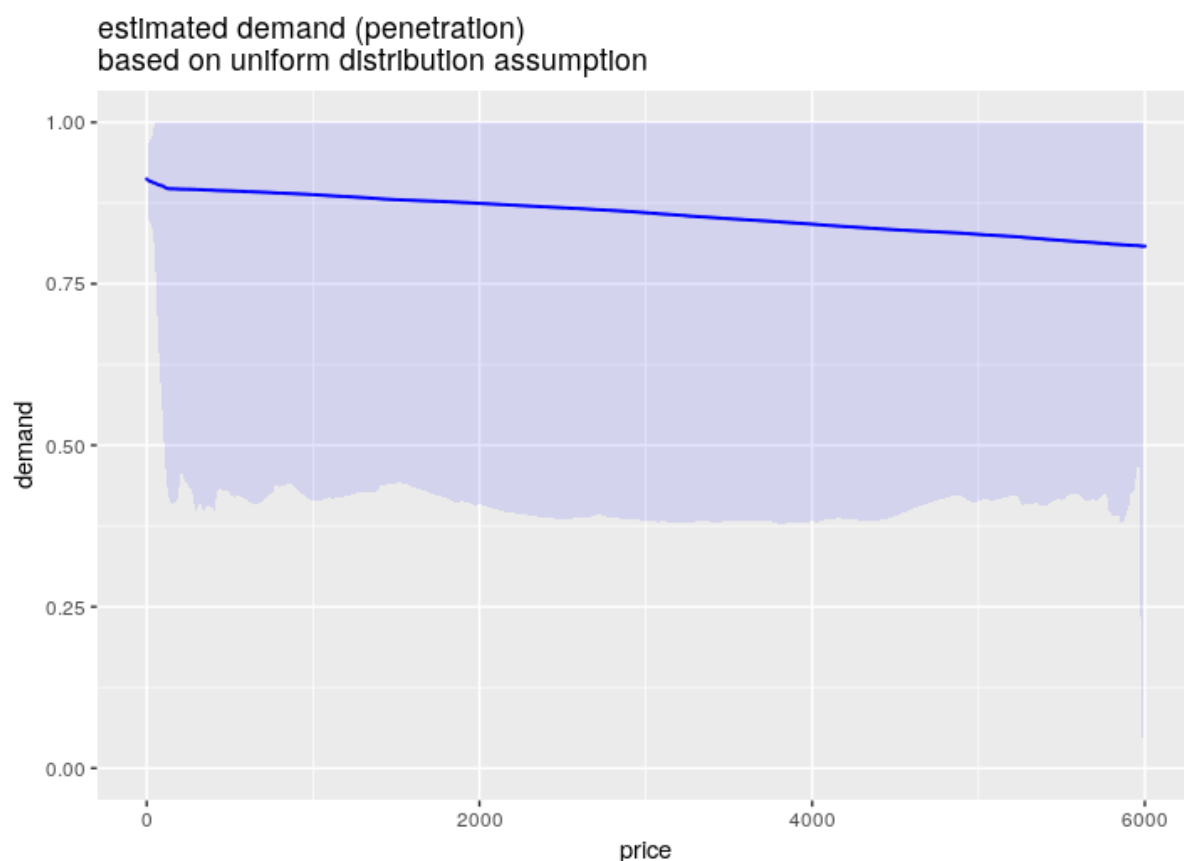
Of course, this estimate only holds for those respondents who bracketed their cutoff price through explicit responses. For those that did not, the uniform distribution assumption is unjustified, since we have no explicit upper and lower bounds. However, we can assume that the previous estimate is representative

of all respondents who would accept the connection for little or no money, and those that would not be willing to pay the full unsubsidized price. It remains then to estimate the proportion of households who would not accept the connection at the most paltry price and those that would pay the full unsubsidized price. In the absence of having explicitly identified these two groups (an error we hope to correct in future rounds), we make the following two assumptions:

1. respondents not willing to pay 10% of the unsubsidized price, will not accept a lower price.
2. respondents willing to pay 90% of the unsubsidized price will also accept the full price

These assumptions, while not unbiased, serve as a reasonable starting point, and can be shown to converge to the truth over several rounds of this methodology.

Having estimated these two values,  $D_0$  and  $D_1$ , respectively, we can then estimate the demand curve.

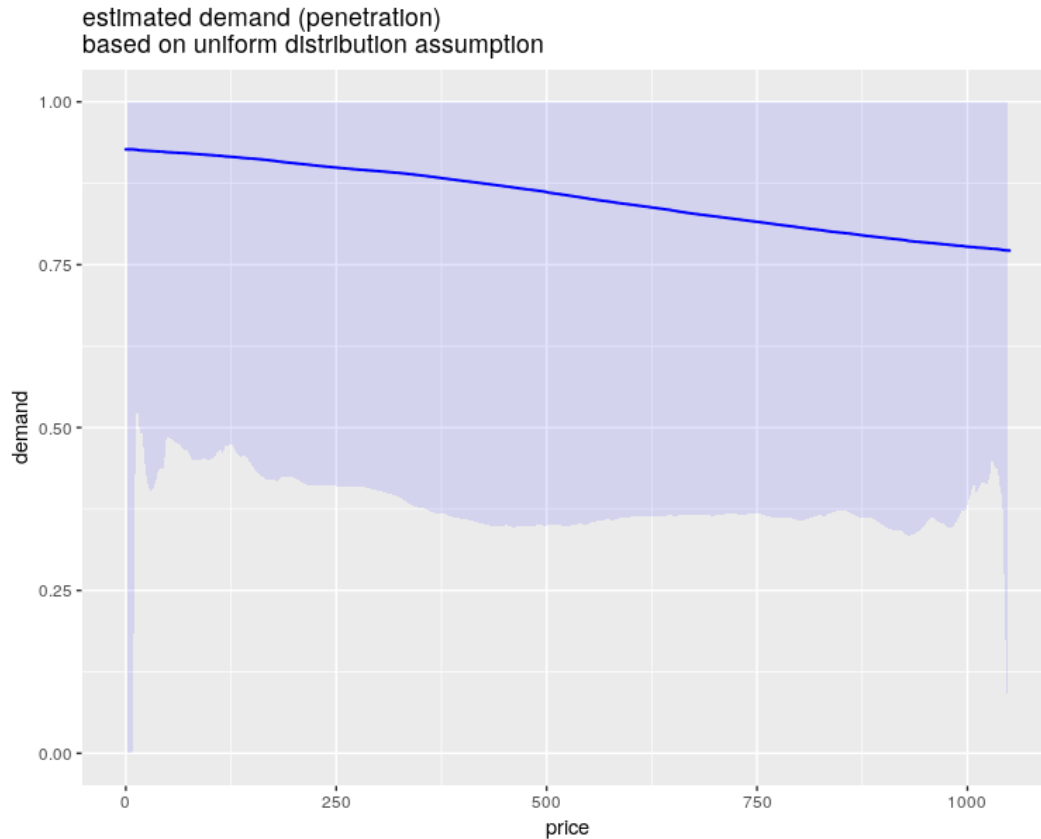


Here we note that the standard error of the estimate is very wide. This is due to the contributions of three different sources of error:

- Error in estimating  $D_0$ ,  $D_1$ , each with a sample size of only about 180. This will hopefully be rectified by explicitly measuring these values.
- Error in aggregating the probabilities from the uniform distribution. This will drop quickly as further rounds are conducted, the width of the unknown ranges falls, and thus the number of unknown responses for each value of  $p$ .

- Error in estimating the demand among price-bounded respondents due to their low number (387 for single payment grid connection). Preliminary estimates suggest that number should rise to about 1400 once  $D_0$  and  $D_1$  are explicitly measured.

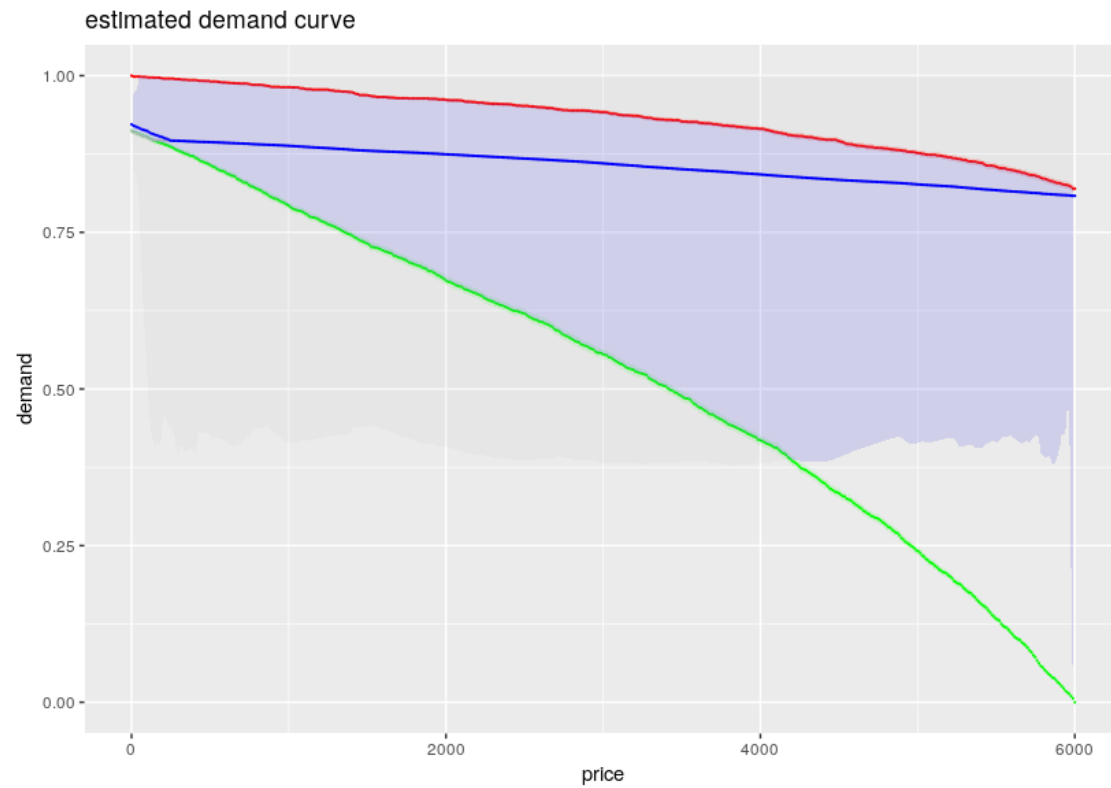
For grid connection on a six month layaway, the error is even greater.



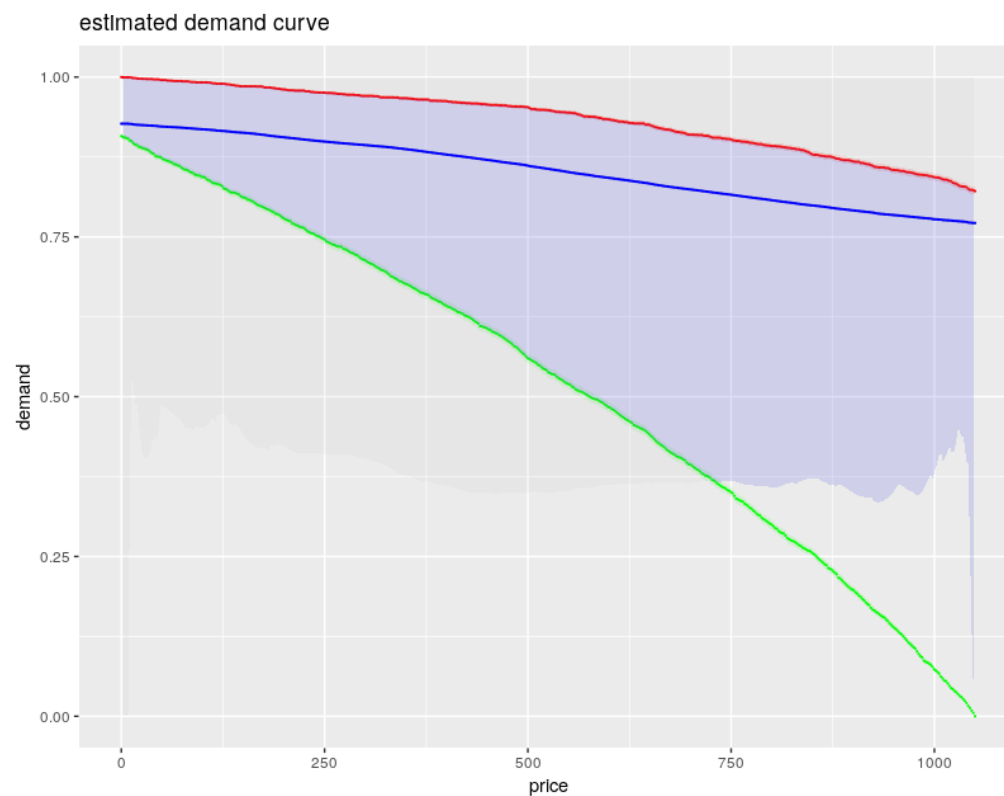
#### *Combining bounds and uncertain estimates*

We note that the standard error of the estimate is greatest for smaller values of  $p$ , as observations tended to crowd towards higher values as respondents indicated a high degree of willingness to pay. The same phenomenon had the opposite effect on the bounding values calculated in the first section since a high degree of willingness to pay kept the maximum penetration high while the minimum penetration is mathematically pinned to zero at the high end. This serendipitous coincidence allows us to compute a combined estimate, leveraging the strong certainty in the bounds to correct the least certain areas of the estimate. Thus we can say that to the extent that the region of uncertainty in the estimate conflicts with the bounds computed from the full data set, the latter effectively envelops the former, reducing the region and thus the standard error.

For the one-off payment for grid connection, we find the estimate equal to the lower bound for all but the highest prices, and a relatively moderate error around 10-15%.



For a grid connection on layaway, the combination provides an interesting estimate where there had been none, and a very narrow margin for high values of  $p$ .





## Annex 3. The research locations

Energy patterns in Afghanistan does not fall into easy binaries such as grid and off-grid or urban and rural. Differing contexts exist between and within provinces, districts and communities. The following section begins to explore these diverse location profiles.

*Nota bene: More detailed information is presented on the associated project website.*

### Community Profiles

The Community Profiling approach was an innovative research tool that assisted in developing a nuanced picture of the social, economic and energy landscape of participant communities. The profiling phase was conducted before the commencement of the survey and focus group data collection. It consisted of a mapping exercise to gain a preliminary and broad understanding of the communities. The community profiling captured characteristics such as demographics, economic activity, migration dynamics, infrastructure and, of course, energy sources and usage. The data and information that was collected provided a base to further refine the research methodology and tools.<sup>2</sup>

### Communities by the Numbers



### A. Kabul



Kabul is the capital of the province and the country, holding the seat of the national government and the majority of Afghanistan's commercial sector. Kabul lies at an elevation of approximately 1800 metres above sea level and is situated on an important trade route between Central Asia and Pakistan. Both the city of Kabul and the wider Kabul province has a mixture of grid-connected and non-grid communities.

#### a) Urban Kabul Communities

Karte Naw, Khair Khana and Dasht-e-Barchi represent the urban Kabul localities. They cover tens of thousands of households, so a neighbourhood segment was chosen in each to represent a community energy sample.

<sup>2</sup> An added benefit of the profiling phase was exposing communities and community leaders to the Samuel Hall team and to the Afghanistan Energy Study. The initial introduction with experienced Samuel Hall staff conducting the profiling and interviews increased community buy-in and the research team's social license to operate.

1. [Kata Bolandi, Dasht-e-Barchi](#)<sup>3</sup> - *Kata Bolandi* is located to the south-west of the center of Kabul. Kata Bolandi is not connected to the grid, although infrastructure has been in place for some years. Entrepreneurs have set-up a large diesel generator that acts as a mini-grid for some households in the area. Many of the dwellings in the community are built with mud-bricks, connected by unpaved roads and informal infrastructure.
2. [Sayed Noor Mohammad Shah Meena, Karte Naw](#) - The Karte Naw community of Sayed Noor Mohammad Shah Meena is located in the south-west of Kabul. It consists of medium-density housing, with paved roads and relatively good infrastructure provision. Like the wider area of Karte Naw, the area is home to a wide range of economic activities including banks, mechanics, food stores, TV repair shops and clothing outlets. The area is almost entirely connected to the grid.
3. [Hasa-e 315, Khair Khana](#) - *Hasa-e 315* and the wider area of Khair Khana is located over the hills to the north-west of Kabul city centre. Khair Khana is experiencing expanded construction of new residential buildings and paved roads, with developing commercial buildings and institutions present in the area.

#### *Rural Kabul Communities*

4. [Deh Yahya](#) - Deh Yahya, in Deh Dabz District, is a community situated north of Kabul airport on the other side of a range of hills, with the city of Kabul sprawling towards it. Many of the residents are returnees from Iran or Pakistan. The community is located in the hills and has a stream flowing nearby. The area is densely populated and predominantly residential - with most shops clustered on the main road. Deh Yahya has no grid connection. Off-grid solutions including stand-alone solar home systems are in use by many households.
5. [Langar](#) - Langar is an agrarian village in Qarabagh district in the far north of the province. Community elders in Langar have been petitioning for grid-connection for over three years; encouraged by the fact that the community is located adjacent to a village (Daudzayee) that is already connected to the grid.<sup>4</sup>
6. [Shewaki](#) - Shewaki, like Deh Yahya, is also slowly being encroached upon by Kabul's urban sprawl, but remains relatively rural with a built-up town center. The town-center has a range of businesses and services. The majority of Shewaki's households and enterprises are connected to the grid, but areas on one side of the town center and also farmhouses in agricultural land outskirts do not (yet) have a grid-connection.

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<sup>3</sup> Please follow the hyperlink for a more detailed description of the locations.

<sup>4</sup> It was pointed out to the research team that a powerful minister was born and owns land in Daudzayee.

Figure 8 Shewaki town, shops, mosque



Figure 7 Surrounding Shewaki, agricultural fields



## B. Herat



Herat Province is one of the largest provinces in Afghanistan by population and is an important trading province. It is located in the west of the country and shares a border with Iran in the west and Turkmenistan in the north.

Herat Province includes one of the major cities in Afghanistan, Herat which has reliable, imported electricity from Iran. Outside Herat City, rural areas are experiencing some levels of grid electrification expansion, with many communities continuing to utilise off-grid solutions.

### Herat Urban Communities

1. [Jebraeel \(Nahia 12\)](#) - The new urban township of Jebraeel is divided into two communities, one forming a part of Nahia 9 and the other a part of Nahia 12.<sup>5</sup> The community sampled Jebraeel Nahia 12 is based on a grid of 21 streets. 16 out of the 21 streets are connected to the grid, while 5 streets are not connected to the grid. Most of the houses are concrete or made of bricks. The streets are unpaved but the nearby main road is paved. A large mosque and a number of shops line the area.
2. [Shaalbafaan](#) - This community is located in the vicinity of Herat city and is densely populated. Most of the houses are concrete, with several multi-storey buildings. Almost all roads and streets in Shaalbafaan are paved and there are many commercial premises and shops on each street. Shaalbafaan is connected to the grid.

<sup>5</sup> A *nahia* is a municipality administrative area.

3. [Naw Abad Shuhadaye](#) - The community is a densely populated urban area lying on flat ground close to the Badghis – Herat Highway. All the buildings in the area are 2 – 3 storey concrete buildings. Many of the households are constructed from brick and concrete. Naw Abad Shuhadaye contains many mosques and shops, and all the main and sub-roads are paved. The community is connected the grid.

*Figure 9 Jebraeel, Zendej Dan District*



#### *Herat Rural Communities*

4. [Qala-e Sharbat](#)<sup>6</sup> - Located in Karukh district, the village of Qala-e Sharbat is located in hilly terrain. Most of the dwellings are constructed from mud and the streets and roads are unpaved. The majority of people are engaged in agriculture. Qala-e Sharbat does not have a connection to the grid. Community members utilise off-grid solutions, with solar home systems being prevalent.
5. [Majghandak](#) - Majghandak is a village of Karukh district and located alongside the Herat-Badghis highway. Almost all of the houses are mud. This area has wide agricultural lands and gardens that are irrigated from the nearby river and deep wells. Roads and streets in the community are unpaved. There are a few shops in the village but more shops are located on the main road. The community is not connected to the grid. A Pico-Hydro Power system is available in the village but only functional in the winter when there is sufficient water in the stream to power the turbine. Stand-alone solar panels are a common sight.
6. [Malikiha](#) - The community of Malikiha is a sprawling village located in Zendej Jan district west of Herat City. Part of the village, consisting of a few hundred households, is connected to the grid. The majority of houses are made of mud. The village is surrounded by farmlands and orchards and a few shops exist in the area.

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<sup>6</sup> Literally 'Fort of Syrup'

Figure 10 Road in Malikiha village, Zinda Jan District, Herat



### C. Samangan



Samangan province is in the north of Afghanistan. Located between Balkh and Kabul, a major electricity transmission line from Uzbekistan runs through the province with growing numbers of communities connected to the grid. Samangan is predominantly agrarian, with tracts of fertile and green valleys surrounded by arid deserts.

The communities in Samangan blur the distinction between urban and rural. Although three communities are located close to the center or Aybak (the district and provincial capital), they are considered agricultural villages with the majority of community members engaged in livestock, agricultural gardens (nuts and fruit), and farming.

1. [Chawghai](#) - Chawghai is a small village with approximately 160 households in Aybak District. Although close to the center of the provincial capital of Aybak, most of the community members are engaged in almond farming. Many residents have migrated abroad. The village has reliable grid electricity, but access to services such as schools, health facilities and paved roads is poor.
2. [Mula Qurban](#) - Mula Qurban is an agrarian village situated close to Aybak center, with desert hills to the north. Many residents work in daily wage labour in larger Afghan cities (including Mazar-e Sharif and Kabul), or have emigrated abroad. The majority of community members work in agriculture. A primary school was built in the village by the National Solidarity Program (NSP). Mula Qurban is almost entirely connected to the grid.
3. [Dalkhaki](#) - The village of Dalkhaki, in Aybak District, lies at the foot of a mountain of the same name, about 30 minutes north of Aybak town center. Dalkhaki has partial grid infrastructure in place but has not been connected to the grid. Dalkhaki is spread out on either side of tracts of



farmland and then further divided into areas tied to the four different mosques spread across village.

4. [Lab-e-Aab](#) - Lab-e-Aab is a village near the border of Balkh lying in a fertile valley in north-eastern Samangan. It is located in the north-eastern Feroz Nackhir District. The village is surrounded by orchards, vineyards, agricultural gardens and farmlands. Lab-e-Aab is not connected to the national grid, although many residents expect the community and their households to be connected within the next year, with grid infrastructure already in place in the village.
5. [Yakatoot](#) - Yakatoot is a village situated on a plain close to the main AH76 Highway between Mazar-e Sharif and Aybak in the Hazrat Sultani District. It is located on more arid ground than the fertile valley region around Aybak. Yakatoot is connected to the grid. Household dwellings are predominantly made of mudbrick and roads are unpaved. Many of the villagers of Yakatoot are engaged in agriculture, mostly on wheat farms but also grape and almond orchard gardens. Many young people have migrated overseas to find work.
6. [Dawlatabad](#) - Dawlatabad, in Hazrat Sultani District, lies at the foot of hills on the edge of the main valley running through Samangan. Dawlatabad is connected to the grid. Agricultural gardens, livestock and farming are the major livelihoods sources. Roads are unpaved and service infrastructure is limited, with a school located in a neighbouring village and health workers visiting the village every three months. Most of the houses are made from mudbrick.
- 7.

*Figure 11 Overlooking a part of Dawlatabad Village from the hills. Beyond the green pastures and farmland in the distance is the AH76 Highway and major import electricity transmission line, between Mazar-e Sharif and Aybak (and eventually onto Kabul).*



## D. Paktia



Paktia is a mountainous province in Eastern Afghanistan bordering Pakistan.

Grid connections were being set up in the capital of Gardez while baseline fieldwork was ongoing. Rural areas of Paktia use non-grid electrical solutions. Paktia is known for its forests, with wood contributing to the province's as well as wider Afghanistan's wood consumption for energy.

### *Paktia (Gardez Communities)*

1. [Baala Deh](#) - Baale Deh is a community near the center of Gardez. It has not been connected to the grid, and people use off-grid solutions such as Solar Home Systems. Although close to the urban center, a majority of people in the community own nearby agricultural farmlands which are irrigated from streams and *kariz* (a system of water wells connected by underground canals used for irrigation and drinking water). The community previously had access to a Pico-Hydro System built by the government, but it is no longer functional due to successive droughts and lack of water. The community sports 14 mosques and a small number of shops.
2. [Bano Zai](#) - This village is flat and roads inside the village are not paved. The majority of people are involved in agriculture. The single storey mud houses are interspersed across a large area and have gardens and orchards between them. The key non-residential buildings in the village are 10 mosques, a clinic and a school. This village is not connected to the grid, and off-grid solutions are in use.
3. [Habib Kala](#) - Habib Kala is a community located approximately one kilometre from two nearby major roads. Almost all dwellings in the community are mud made and the roads inside the village are not paved. The majority of community members are engaged in agriculture, working on farmlands and in agricultural gardens. The main sources of irrigation water are deep wells and *kariz*. There are a few shops inside the village along with 7 mosques. Habib Kala has not been connected to the grid.

### *Paktia (Chamkani and Dand-e-Patan Communities)*

4. [Mandokhail](#) - Mandokhail lies in the Chamkani district of Paktia. The wider district of Chamkani lies across two intersecting valleys to the east of the provincial capital, Gardez, with Mandokhail located along one of the valleys. The majority of people living in Mandokhail are involved in agriculture, and tend to farmlands and gardens. A large system of *kariz* flows through the middle of the village and is the primary source for irrigation water. Houses are interspersed over hills and flat terrain, and there are surrounding pine forests. Mandokhail is not connected to the grid and many households utilise stand-alone solar panels.



Figure 12 Mandokhail village, Paktia

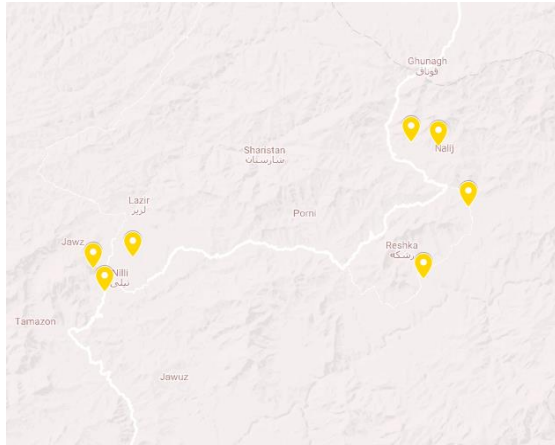


5. [Nargese](#) - Nargese is located close to the Pakistan border in hilly terrain. Nargese lies in the hills north-east of Chamkani center and household dwellings are located over the range of hills. The surrounding mountains and hills are covered by Walnut Trees and Chilgoza Pines. The village has farmlands and is irrigated by 4 different systems of *kariz*. The community is not connected to the grid. A clinic, schools and shops line the nearby Chamkani road.
6. [Patan Kalai](#) - Patan Kalai in Dand Patan District is situated on the border with Pakistan and the terrain is a mixture of flat and hilly areas. A river (*Kolaye Seand*) flows to the south of the village and the majority of the households and the agricultural lands lies between the river and the main road to the north. The houses are made from mud. There are a number of mosques in the border village, and a few local shops. However, people usually shop in the district bazaar as it contains a large market. This community is not connected to the grid.

Figure 13 The President of Afghanistan, Ashraf Ghani tweeting about the inauguration of the Arghande-Gardez Power Line and Gardez Sub-station, on 1 April, 2018. It shows the ongoing and rapid changes in the energy sector, and directly affected sampled communities



## E. Daikundi



Daikundi is a rural province located in the central highlands of the country. The province is situated in the traditionally ethnic Hazara region known as the Hazarajat. The provincial capital is Nili. The province lies across high mountains, with Nili situated over hilly terrain and many villages in Daikundi located in valleys. Communities in Daikundi are not connected to the grid. However, DABS does conduct small operations in the province, but the service is limited to government facilities and some small businesses (i.e. hotel, restaurants, shops). DABS provides diesel power to customers from 8am to 4pm every day.

1. [Qarya-e-Dasht](#) - Qarya-e-Dasht<sup>7</sup> is located approximately 30 minutes by vehicle from the center of the capital. While community members can access basic goods and services from a small number of shops in the village, they usually purchase the bulk of their goods and services from the main market Old Bazaar in Nili.

Households in Qarya-e-Dasht are spread out and dwellings are made of mud and stones, with the majority of houses not having surrounding walls for protection. The lack of water and the sandy soil of the area has led local farmers to grow almonds which are drought-tolerant and can grow in sandy soil. Qarya-e-Dasht is not connected to the grid. Wells are used for drinking water and some households have installed moveable solar panels on their wells to assist in pumping water.<sup>8</sup> Many households have access to television media through satellite dishes.



Figure 14 Dasht Village, Nili, Daikundi

2. [Sang-e-Mum](#) - Sang-e-Mum in Nili District lies in a valley and is surrounded by rocky mountains on all sides. Its major source of water is fountains that are abundant in the spring season but not in summer or winter. The Lazir river lies approximately 12 km away. Most of people are engaged in agriculture, with smaller numbers of community members involved in daily wage labor. The

<sup>7</sup> Literally : 'Village of the Desert'

<sup>8</sup> The moveable solar panels do not require batteries as energy storage or because two 250 watt solar panels are able to withdraw water from a well to the surface

main agricultural product are almonds, but the area has recently experienced prolonged periods of drought. There is one school in the village for both boys and girls. Sang-e-Mum is not connected to the grid. Many community members have access to deep-water wells and withdraw water using solar power.

3. [Sar-e-Nili](#) - Sar-e-Nili is a village neighbourhood of the provincial capital of Daikundi. The village is hilly and almost entirely surrounded by rocky mountains. The village is full of trenches with houses being built along the rocky hillsides. Most of the houses are constructed from adobe bricks with wood ceilings. Community members are usually engaged in agriculture or daily wage labor. Many young people have moved to Iran for work. The Community Development Council (CDC) built a hydro micro-grid system in 2011 but the system ceased to work after one month of operations. Machine parts were reportedly stolen by thieves and now the hydro-system does not function.

*Figure 15 Pico-Hydro System in Sar-e-Nili, Daikundi*



4. [Khuja Chasht](#) - Khuja Chasht is located in Shahrestan District, in the hills with high mountains to the west and the Helmand River to the east. The village is not densely populated, with mud houses spread across a large area on the hills. Along with farming, villagers also herd sheep and produce of *gelam* and *nemad* carpet products from sheep wool. There is one primary school but no secondary school in the village. The nearest clinic is in the district center, approximately 20 minutes drive from Khuja Chasht. Khuja Chasht village is not connected to grid. A diesel-powered mini-grid operated in the village but broke down in 2011.

5. [Ghaaf](#) - Ghaaf village in Shahrestan District is a sparsely populated village with the single-storey mud households spread over a large area. The village is located in hilly and mountainous terrain approximately lying approximately 20 kilometres away from the Helmand River. There is a secondary school for boys and a secondary school for girls in the community. This community is not connected to grid.

*Figure 16 Ghaaf, Shahristan District, Daikundi*



6. [Charkh](#) - Charkh, in Meramoor District, is a large valley which consists of more than 1200 households spread across 6 Community Development Councils (CDCs). Most of the people living in Charkh valley are engaged in agriculture. Many young people migrate to Iran and Pakistan to search for higher paying job opportunities. Charkh village is located in rugged hilly terrain surrounded on three sides by mountains. The village lies next to a river that flows during the spring season, but usually runs dry in the summer. The houses in the village are constructed of mud and the community is not densely populated, with houses spaced 100 to 200 metres away from each other across hills. This community is not connected to grid. Six households in the community installed a Pico-Hydro System on the river that flows through the valley, generating electricity in the winter and spring but not in the summer or fall because of the river water levels.

Table 1 Prices of selected energy-related items in the research communities according to key informants

Province	District	Community	Grid Connection	Generator	Solar lantern	Solar-home system	Battery for solar	Diesel per litre	LPG per kilogram	Mini-Grid Connection	Wood per ser (7kg)
Kabul	Kabul	Dasht-e-Barchi		10000	1050	4000	8000	50	60	5000	
Kabul	Kabul	Karte Naw	20000	8000	500		18000	41	60		
Kabul	Kabul	Khair Khana	15000	15000		5000	4000	47	60		
Kabul	Deh Sabz	Deh Yahya		5000 - 30000	600				60		100
Kabul	Qarabagh	Langar		15000		5750	7000	50	65		
Kabul	Bagrami	Shewaki	7500	6000		2200	3700		55		
Samangan	Aybak	Mula Qurban	20000	12000	250	12000	8750	46	60		
Samangan	Aybak	Chawghai	10000	8500	250	10000	3000	46	70		
Samangan	Aybak	Talkhaki		3750	400	11000	5000	45	50		
Samangan	Hazrat Sultan	Dawlatabad	5000	5000	450	9500	5250	46	60		
Samangan	Hazrat Sultan	Yakatoot	13500	9250	375	7500	4750	46	60*		
Samangan	Feroz Nakchir	Lab-e-Aab	5000	9250	400	8500	5750	50	60*		
Paktia	Gardez	Baala Deh		16250	1750	18750	5000		65		74
Paktia	Gardez	Habib Kala		25000	2000	25000	5250		60		91
Paktia	Gardez	Bano Zai		40000	1000	40000	5000		50		88
Paktia	Chamkani	Narqese		40000	2667	26667	5333		68		77
Paktia	Chamkani	Mondakhail		Discrepancies	3333	28333	Discrepancies		52		83
Paktia	Dand Patan	Patan Kalai		28333	Discrepancies	21000	16000		50		
Herat	Herat	Jebraeel	21000	5000		6000	4000		54		
Herat	Herat	Shaalbafaan	8500	10000		10000	6000		50		
Herat	Herat	Naw Abad Shuhadaye	10000	10000		4500	8000		48		
Herat	Karukh	Majghanda k		7000		4500	6000		50	Free	
Herat	Karukh	Qala-e-Sharbat		8000		7500	3000		50		
Herat	Zindajan	Malikiha	16500	9000	500	8000	3500		60		
Daikundi	Nili	Qarya Dasht		Discrepancies	450	8000	7000	50	70		
Daikundi	Nili	Sar-e-Nili		3000		5000	6250	55	65		
Daikundi	Nili	Sang-e-Mom		8000		11500	8000	55	70		
Daikundi	Shahrestan	Ghaf		8000		8500	6000	55	70		
Daikundi	Shahrestan	Khuja Chasht				10000	5250	55	70		
Daikundi	Meramoor	Charkh				10000	6250	58	73		



## Annex 4: Seasonal Case Study Stories

### Household profiled for seasonal case studies

Kabul	<p>Dasht-e-Barchi (Urban)</p> <p>The household is located in Kabul's 13th district and has 8 members. The head of the household is self-employed and does construction work, and the mother is a homemaker. The main source of electricity for this household during the first-round case study (summer 2018) was mini grid, but it was connected to the grid between rounds 1 and 2. They use LPG gas for cooking and wood for heating water and baking bread. Wood and coal are used for heating.</p>
	<p>Langar (Rural)</p> <p>The household is located in Langar Village, in Qarabagh district of Kabul, which is a rural outskirts of Kabul. There are 19 people in the family, and the head of the household is engaged in agricultural activities. The main source of income is revenue from their field and also remittances that one of the family's members is sending from the United States. The main source of energy for the household is solar for lighting and gas and wood for cooking and baking.</p>
Herat	<p>Jebraeel (Urban)</p> <p>The household is located in Jebraeel district of Herat city. The household has 10 members. The head of the household runs a stationary shop. The main source of electricity is grid power and they use LPG gas for cooking.</p>
	<p>Majghandak (Rural)</p> <p>The household is located in Majghandak district. 9 people live in the household. The head of household works in agriculture. The main sources of energy are solar, mainly for lighting, and animal dung and wood as fuel for cooking.</p>
Samangan	<p>Chawghai (Urban)</p> <p>The household is located in Chawghai, a village of Aybak city (the capital of Samangan) and has 8 members. The head of the household is a farmer and their main source of income is from agricultural activities. The main source of energy is grid power, and they use wood and animal dung as fuel for cooking and heating.</p>
	<p>Yakatoot (Rural)</p> <p>The household is located in Yakatoot district of Samangan alongside the Aybak-Mazar highway (AH76) and has 9 members. The head of the household is a driver. The main source of electricity for this household is grid, which they use for cooling, lighting, and for entertainment (watching TV). They use LPG gas, wood and animal dung for heating water and cooking. In the winter, they mostly use wood and animal dung as fuel for their sandali (traditional heater).</p>

Daikundi	<p>Sang-e-Moom (Urban)</p> <p>The household is located in Sang-e-Moom village, located in the vicinity of Nili (the capital of Daikundi), and has 5 members. The head of household is engaged in agriculture (almond gardening and crops) and runs a shop in the community. The main sources of energy for this household are solar for lighting &amp; charging mobile phones. They use wood, animal dung and LPG gas for cooking and heating.</p>
	<p>Khwaja Chasht (Rural)</p> <p>The household is located in Khwaja Chasht district of Daikundi and has 7 members. The head of household is a teacher, and engages also in agriculture and livestock activities. The main source of electricity for this household is solar, which is used for lighting and charging cell phones. They use LPG gas for boiling water, wood and animal dung for cooking, and LPG for heating the house in the winter.</p>
Paktia	<p>Baala Deh (Urban)</p> <p>The household is located Baala Deh village of Paktia, which is close to the provincial capital Gardez, and has 4 members. The head of household is engaged in agriculture, and their main source of electricity is which they use for lighting, charging cell phones and watching TV. They use a mix of energy sources for heating and cooking - wood, animal dung and LPG for heating water, wood and LPG gas for cooking, wood and animal dung for heating rooms in the winter.</p>
	<p>Mondokhail (Rural)</p> <p>The household is located Mondokhail, in Chamkani district of Paktia. It has 20 members. The head of household works in agriculture, and one of the members is employed in the security forces. A relative also sends remittances from Dubai. One of the women works as a tailor at home. The main source of electricity for this household is solar, which is used for lighting, charging cell phones and watching TV. They use wood for heating water, LPG gas for cooking, and wood and LPG gas for heating rooms in the winter.</p>

***Nota bene: in the following case studies, names were changed for privacy reasons.***



## A. Kata Bolandi, Dasht-e-Barchi, Kabul

Kata Bolandi is a community in Dasht-e-Barchi, the area sprawling in the west and south-west of Kabul city. On the outskirts of Dasht-e-Barchi, and therefore the outskirts of Kabul, Kata Bolandi has many unpaved roads winding between low-to-medium built houses, often surrounded by mud-brick or concrete walls.

Figure 17 The streets of Kata Bolandi, Dasht-e-Barchi, Kabul



The Shafaq family who took part in the *Energy Seasonal Case Studies* owned a one-storey house with a front yard and multiple rooms. The two parents, Amiri and Habiba had six children. The father, Amiri, worked as a daily wage labourer in construction, a highly seasonal job that usually was remunerated 300 Afghanis per day (approximately US\$4). and the mother is a homemaker. One older son was studying photography at university, but found a job as a security guard for a rug-making factory during the course of the year. Another son had dropped out of school to sell vegetables and fruit from a cart. An older daughter was studying accounting at an institute, and the remaining children, including a son, Samim, all went to school.

### Connecting to the grid

Like many others in the Kata Bolandi community, the household connected to the grid between Round 1 of the seasonal case studies in Summer and Round 2 in Autumn. This offered the opportunity to chart changes for a family connecting to grid electricity.

/

Figure 18 Admiring the new, working grid box in Kata Bolandi, Dasht-e-Barchi, Kabu



Before grid connection, the family used a local mini-grid in the area, as well as their solar. The mini-grid was a diesel generator that supplied electricity to a few hundred households in the evening, between 5pm and 9pm. Grid electricity offered a marked decrease in costs compared to the mini-grid. Amiri, the father of the household spoke about the initial costs to connect to the grid, said: *“We spent 11,000 Afghanis to get [grid] electricity for our home. This included AFN5062 for registration, AFN900 for the electricity meter, AFN3000 for the wiring and 2000-3000 for other things.”*<sup>9</sup> After the initial cost to connect to the grid, the household were paying much cheaper rates – AFN2.5 per kW compared to AFN40-50 per kW for the mini-grid.<sup>10</sup>

Despite the reduction in costs, the household did experience issues with their billing for grid electricity. *“Our neighbours have washing machines, flatirons and vacuum cleaners and their bill was equal or less to our 380 Afghanis. We don’t have any [of these electrical appliances] but still our bill was very high. I went to the person responsible at the electricity junction and asked him the reason behind our high bill costs, he came and reread our bill [which was wrong]. The bill cost for another one of my friends was very low, as I know they consume a lot of electricity... If the meter readers consider honesty in their work, then we won’t be faced with any problems. If they add electricity kilowatts for their personal profit in our bills, then slowly, slowly it may cost too much for us.”*

The household had kept their solar home system, using it as a back-up during times when they experienced outages in the grid electricity, which happened quite often. *“We have one solar panel and two small batteries. We charge these batteries during sunny days and we use them for lighting and charging phones while there is no [grid] electricity. My son takes one of these batteries to his work selling fruits from his cart.”*

9 Approximate equivalent costs in US dollars were: \$65 for registration, \$12 for the electric meter, \$40 for the electric wiring and \$25-\$40 for “other things” [sic].

10 These are most likely approximations given by the mini-grid operators to households they served.

Figure 19 Using the old solar panel and battery as a back-up source of electricity. A mobile phone is charging.



Even with the billing issues and outages, connecting to the grid represented a major upgrade for the household compared to the old mini-grid and their solar home system. They used the grid to watch television, light their house and charge their computer and mobile phones. *“We have four mobiles in our house. One of them is a smart phone and the other three are simple mobiles. The smart phone is with my son and he uses the internet on it. Sometimes we use it too, to call our relatives who are abroad,”* said Habiba.

Samim, the young boy in the house, used electricity to watch recreational shows and football on television, for lights to study after school, and to watch films with his older brother on his computer. Samim did not need to collect fuel or use electricity for chores regularly, but would bring back an LPG balloon from the bazaar every few weeks.

#### Cooking and heating

Like many families in Afghanistan, the Shafaq family used a range of linked methods to cook food, heat water and heat their home in the colder months. Habiba walked ten minutes to a family member’s house to use their *tandoor* oven to bake bread a couple of times each week. The family used a *samawar* water boiler to make tea, but also sometimes to warm water for washing clothes and bathing. They often used their wood-heater *bukhari* to heat the home and to prepare breakfast, and sometimes to boil water on it instead of using the *samawar* if the *bukhari* was on already in winter. Otherwise, they cooked food on a gas-stove. For fuel, Habiba said *“we use wood, we burn [cardboard fruit] cartons and coal. In the morning, we turn on the heater for one hour to both try to warm the room, and to prepare the tea.”* The family is also keenly aware of the seasonality of fuels and their prices. *“In winter, the expenses go up and every one (poor or rich) needs to start fires in their heaters for heating. Therefore, the price of fuel increases, and wood becomes expensive,”* noted Amiri.

Figure 20 A samawar water boiler



## B. Langar, Qarabagh, Kabul

Langar is an agricultural village in the far north of Kabul Province in Qarabagh District. The household in the seasonal case studies was large, with 10 members of the family living on the compound and 9 other family members living elsewhere. The household relied on agriculture from their grape fields, incomes from the sons and daughters who worked as schoolmasters and teachers, as well as remittances from a son in the United States. The wife of the household, Rohina, and sometimes her daughters and daughters-in-law, did all the cooking, cleaning, childcare and other chores in the house.

*Figure 21 Langar Village, northern Kabul Province*



### Off-grid solar and generator

As there was no grid connection in the village (though the neighbouring village *was* connected to the grid), the family relied on solar solutions for their electricity. They used solar for approximately 5-6 hours each day: for lighting the house, charging their mobile phones and watching television, usually after dinner until 10pm when most of the family members went to bed. The family said they accessed culture, politics and sports media on their televisions – although they could not watch television for unlimited hours due to the capacity constraints of their solar home system. In the hotter months, the family also used two fans to cool their rooms. The family had eight mobile phones. They used them to contact family and friends. One of the phones was a smartphone with 3G internet which one of the adult sons used to collect information for his job, and which the rest of the family sometimes used to video call with family members abroad. The child who participated in the seasonal case studies was a girl in Grade 7 named Robina. Robina used the lights powered by the solar home system for her home during the evenings. The head of the household noted that lighting from their solar home system had completely replaced the use of *alekain* oil lanterns that used to be used to light rooms in the house.



The household used two solar panels - one 150 watts and another 200 watts, along with two batteries, one 100 amperes and the other 150 amperes. The first solar panel they purchased in the time of the Karzai government (before 2014), for AFN20,000 or approximately US\$250. The second panel they bought in 2016 for AFN6000 or approximately US\$75. Their acid batteries usually last for a year and a half. The last battery replacement cost AFN7400 or US\$92.50.

*Figure 22 Solar battery in the Langar, Kabul household*



Previously, they had also used solar for pumping water as well. However, the groundwater levels had lowered so much so that their solar systems did not generate enough power to draw water any longer. The family used a gasoline generator to pump water from their well in their yard, usually for 20 minutes daily but sometimes for up to 5-6 hours per day dependent on their water needs. These varying needs included more water for washing and to irrigate their fields, via filling the water tank on the household property. The family would irrigate their fields three times a month.

*Figure 23 The household's fields in winter*



## Cooking and heating

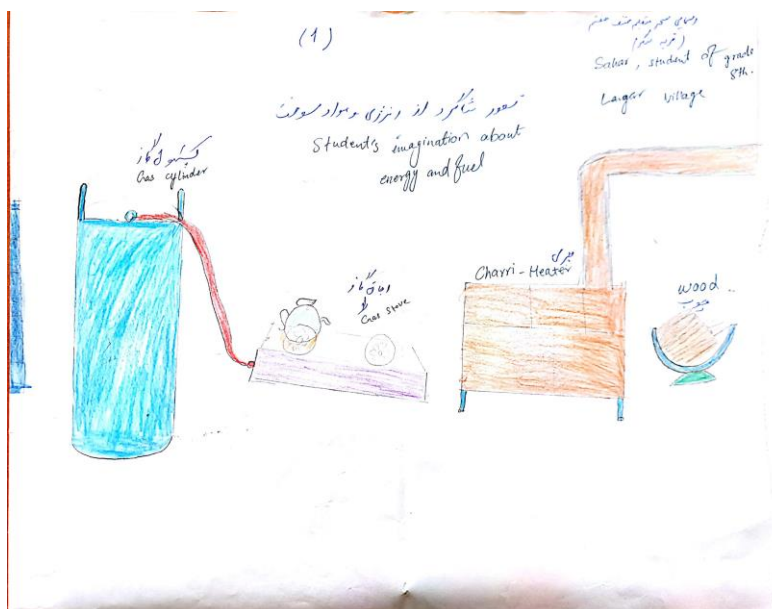
The family primarily used LPG for cooking and making tea, and wood and animal dung for baking bread. They boiled water in their *samawar* water boiler which used wood. LPG had replaced wood as the cooking fuel of choice, and LPG was purchased from the central district market in Qarabagh approximately 4km from their house, and transported by car or motorcycle. The family estimated that they spent AFN1700–1800 AFN or US\$21–22 monthly for LPG.

Figure 24 The family's gas stove



In the cold winter months, the family used *bukhari* space-heaters, and mostly used wood and sometimes coal. The family estimated they spent AFN15,000 or US\$187.50 each year to purchase the fuels necessary for winter, supplemented by gathering biofuels. The family collected and stored wood and brush from their agricultural gardens.

Figure 25 Child visualisation of the gas cylinder for cooking, and the bukhari heater using wood



### C. Baala Deh - Paktia

The family living in Bala Deh, the urban case study location in Paktia, was comprised of four members: the father, mother and two children. This was a relatively small family by Afghan and especially Paktia standards.<sup>11</sup> The only educated person in the family was Anwar, the 12-year old child respondent. The father of the family, Rashid, was engaged in agricultural activities and cultivating wheat. The family was originally from the Baala Deh area and have lived in the district their whole lives, except for having migrated once to Pakistan for three years. The family did not have any specific income outside of Rashid's agriculture activities. Rashid discussed how his desire was to buy a cow to generate an income from the dairy, but could not afford to at the time. The wife of the family, Malala, did all the household chores. She indicated she was interested in working outside of the home, but due to cultural restrictions of the community, she was not able to.

*Figure 26 The Baala Deh household compound, Paktia*



#### Energy

The family used solar energy and were not connected to the grid, which was not available in the area. They lit the house, charged mobile phones and watched television through solar energy. The family did not use the internet but they indicated interest in using it in the future. The Baala Deh family did not have any cooling or heating systems powered by electricity. For cooking, the family used gas and fuel such as wood and animal dung. The family consumed an average of 10 kilograms of gas per month in the summer for different purposes including heating water, making tea and cooking. The family did not have any water source in the house and they received water from the nearby well. Anwar, pictured drawing the child energy visualisation and in the 6th grade, said they used solar electricity at his school as well. Anwar used the lighting provided by the solar home system at night for studying.

*Figure 27 Anwar drawing the child energy visualisations*



<sup>11</sup> The average household size for Paktia in the Baseline Survey was 15.3 members



The family indicated that they were neither entirely satisfied with their solar power, because the solar home system had been damaged and cloudy weather negatively affected their power supply, nor with the cost of fuel, because gas was very expensive. *“The solar energy we use is too weak. Sometimes the battery is damaged, or the lines get damaged. Mostly, the solar battery doesn’t get charged due to cloudy skies,”* complained Rashid. The family expressed their willingness to pay for connecting to the grid with a monthly amount of AFN2000 (US\$25), so they might be able to use other electrical appliances. The wife of the family had asthma, blamed on fumes, smoke and dust from using gas and wood. The family bought and collected their fuel from the market bazaar. Rashid thought a major reason for unemployment in their village was the lack of grid electricity, which meant there were no factories and therefore working opportunities.

In autumn and winter the usage of fuel increased a lot and the family was upset because they had difficulties in paying the costs. During winter, the family only used the solar energy for lighting the house and charging their mobile phones, because the weather was mostly cloudy and rainy and the battery could not be properly charged. The family used torches for lighting when they were going out of their house during the night. If the household had grid electricity, Malala imagined her life would change with many of the chores including washing and ironing clothes, boiling water, cleaning the house and cooking being completed, and made easier, with electrical appliances.

The community of Baala Deh was said to have previously been using a mini-grid, but this had changed in the years previous to the seasonal case study with all the households in the village now using solar home systems. Rashid summarised changes in the energy patterns that he had perceived: *“There have been a lot of changes from the energy point of view and its usages. Previously, a lot of houses were connected to one generator and each family had to pay the owner of the generator. But now, everyone has got a solar system at their homes and it is almost free because the energy comes from the sun for which we don’t have to pay anything.”*

Figure 28 A canal running through the village of Baala Deh, Paktia



#### D. Mondokhail, Chamkanai – Paktia

The family living in the village of Mondokhail, in the Chamkani Valley in Paktia, was a large family which included 20 members. This included eight men, nine women and three younger children, living in a large compound in a mountainous area. The women of the family were not employed, but the mother of the family, Selay, did work alongside her sons in the family's agricultural fields. She lamented the cultural restrictions around female education and work in Paktia. *"I am illiterate. I wish I had gained education so now I could have a better life. The problem is with our society that it doesn't let ladies get education."* One son was working in Dubai and sending back remittances until he returned between the Summer (Round 1) and Autumn (Round 2) rounds of the seasonal case studies to get married. The women of the family all engaged in household chores. The mother and daughter also prepared milk and yogurt at home, with the men selling this produce in the market bazaar. *"Sometimes when we gain more than we need from the fields, we sell it in the market. My daughters-in-laws and I milk the cows at home and also make yogurt. Then the men take [the milk and yogurt] to the market to sell them, while sometimes people come to our house for the yogurt and milk."*

Figure 29 The Chamkani valley, Paktia



#### Solar energy

The family was using solar energy, with no grid available in the area. Their solar home system was comprised of two solar panels, one bought for AFN8000 (US\$100) and another which was given by an NGO, along with two batteries. The household used the solar power for lighting the housing compound, watching television and charging mobile phones. The family said that they could not use a lot of appliances due to insufficient electricity, citing fans, a refrigerator, an electric sewing machine and a washing machine amongst other appliances that they thought they would be able to use if they were connected to the grid. During winter, the solar home system often could not light the house through the night. During the summer, there were no options for space or product cooling. *"We don't have any appliance like a refrigerator to keep food fresh. Our solar electricity cannot support such an appliance and we don't have the grid energy to be able to use one,"* noted Selay. On top of the poor quality of their solar, the family also complained about the cost because the batteries were often damaged and costly to repair or replace. However, solar represented an upgrade in the lighting, with the house previously being lit by oil lanterns.

*Figure 30 Powered by solar electricity - the house in Mondokhail, Paktia*



The household used animal dung and wood collected from the mountains as fuel for cooking, boiling water and baking. They more rarely used gas, which was bought from the market, except in late autumn and winter when they could not collect wood because the mountains were covered in snow. During the winter months, the family also bought stores of wood supplementing their stores of collected wood and animal dung. Outside of winter, Aman, the father of the family, collected wood from early morning to midday, for approximately five hours each day. Aman was often joined by the children in the family in collecting the wood. The family stated that the preparation of the animal dung was unhealthy, producing a bad smell and harming the skin. The family also complained about the difficulties in collecting bushes and firewood from the mountains, including injuries to their hands. During one of the seasonal case studies, one of the female members of the family was suffering from a chest infection which was blamed on the smoke from doing chores and cooking. In autumn and winter, the fuel expenses had increased markedly as the family needed to warm the house with the weather being so cold.

*Figure 31 Aman, the male head of household, taking part in the seasonal case study interview*





## E. Sang-e-Moom, Urban Daikundi

Sang-e-Moom, a community close to Nili, the provincial capital of Daikundi in the central highlands of Afghanistan, was the location of the urban Daikundi seasonal case study. Five family members made up the household. All five grew up in Sang-e-Moom, except for when the family migrated to Iran during Taliban rule, having returned to Afghanistan eight years ago. The male head of household, Muhammad, was engaged in agriculture, with an almond garden and other assorted crops, and also ran a goods shop in Sang-e-Moom.

Figure 32 The household in Sang-e-Moom, Daikundi



The family used solar as their electricity solution to light their house and charge the four mobile phones (including one smart phone). Muhammad spoke about how the family obtained their solar home system, and some of the issues around its use. *“We have received the solar panel from the National Solidarity scheme 10 years ago.<sup>12</sup> We have changed 10 batteries throughout 10 years... which has cost us almost AFN50,000<sup>13</sup>... We use it for charging mobiles and lighting the house. The energy is too weak to support any other appliances. We have a TV but the energy is insufficient to turn it on.”* Nor was there sufficient energy to use fans or a refrigerator during the hotter months. In winter, there was just enough solar electricity to turn the lights on for one to three hours while it was dark, dependent on how sunny it had been that day.

12 The National Solidarity Programme (NSP) was a community development initiative that funded small-scale development projects in villages across Afghanistan, first commencing in 2003

13 US Dollar equivalent to approximate \$635. This is an estimation on the part of Muhammad, and perhaps even an exaggeration. The female of the household did confirm that the batteries did get damaged a lot, and had to be continually replaced at a cost of AFN2000-3000 (US\$25-40) for each unit

Figure 33 A television dish and solar panel crowning the rooftops



Still, the solar home system as well as the introduction of LPG were considered major changes in the energy patterns of the family and of the broader community. *“A lot of changes have emerged from the energy point of view. Previously there was no gas and electricity and people used to manage fuel and energy with a lot of problems. Now that we have access to gas and electricity it really helps us a lot to have improvements in our life as we can perform a lot of activities even at night with the help of light,”* said Muhammad. This was echoed by a female member of the household, Maryam. *“Gas is also helping us a lot while cooking and making tea... Both gas and electricity let us live a comfortable life and keep us away from smoke and dust.”*

While LPG had become the main fuel for the family to cook, wood and animal dung remained the major fuel in use for heating during the cold winters. Muhammad also pointed out some issues with these fuels. *“My family members have sore eyes and chest infections due to the smoke from dung and wood.”* The child who took part in the seasonal case study interviews helped collect fuel. *“Yes, I collect fuel once a week in the late afternoon and I bring it home with a cart which takes me one hour. Sometimes I go to the bazar to buy gas which takes me 30 minutes.”* Apart from fuel collection, the child said his school did not have any electricity. At both home and his family’s shop, he used electricity for lighting but also for his phone (used to play games) and for a computer (used to study), each used for one hour daily.

Figure 34 Piles of wood, and piles of animal dung used for fuel



## F. Khwaja Chasht, Shahrestan District, Daikundi

Far from the major city centres of Kabul, Kandahar, Herat, or Mazar are villages such as Khwaja Chasht, Daikundi, in the central highlands of the Hazarajat region of Afghanistan. The seasonal case study household, headed by Wahid, had seven family members living on the compound. Wahid was a teacher, but also engaged in agriculture and livestock activities. Wahid taught half of the day and spent the other half working in the fields, especially in autumn during the wheat harvest. *“I have trees like almond, apple, peach in our garden. Annually, I earn 20,000 AFN (US\$250) from selling the yields of my garden.”* Sadif, Wahid’s wife, was a housewife, and helped in the agricultural fields and also collected wood and leaves for fuel. Sadif and the females in the household also reared chickens and turkeys for eggs and their meat, along with cows for milk, yogurt and their animal dung (used for fuel). While there may have been less strict gender segregation in Daikundi compared to some other provinces in Afghanistan, like almost all the seasonal case study households, housework was highly gendered. *“Males bring water, but they don’t take part in cooking and cleaning, as it is not considered good in our society.”*

Figure 35 Overlooking Khwaja Chasht in Daikundi



Like almost all households in the Daikundi sample, Sadif and Wahid’s family used a solar home system for their electricity. They used it for lighting (between 5pm and 9pm), charging their three mobile phones, powering a computer and a television. The family also sometimes listened to radio in the evenings. The females in the house watched television for entertainment. The family would sometimes use their mobiles to make calls to other family members. If the solar home system was not working, the family would charge their mobile phones at a neighbour’s house. The 75-volt solar panel was provided by the Ministry of Rural Rehabilitation and Development (MRRD) in 2014. The family bought the 100-ampere battery themselves for AFN6000 (US\$75).

Figure 36 A solar panel outside the Khwaja Chasht household



Seasonality played a large role in the family's energy patterns. They implicitly recognised the rise in demand and decrease in supply during the colder months. *"We get less electricity in these seasons [autumn and winter] though we need it a lot more than any other season. In this season, we can't use the lights a lot because the weather is cold and the days are short so the solar panel cannot get enough charge the way it used to in previous seasons,"* said Wahid. Sadif echoed this sentiment. *"Sometimes I watch TV for 30 minutes because there is not enough electricity to watch it for longer. In previous seasons, I used to watch it more often because the weather was warm, mostly sunny and the days were longer so the battery was getting fully charged."*

The capacity issues of the solar was the main reason behind the family's expressed aspirations to connect to grid electricity. *"In the future we want to have access to national grid power or an electricity dam should be built for our area. With access to better energy we will use refrigerator, fan, TV, washing machine and many more. It will help us a lot,"* said Wahid. Sadif agreed, likewise citing a refrigerator, fan, washing machine, and adding an iron, none of which the family could use due to insufficient electricity.

The family used LPG for their cooking, which was usually bought once per month from the district bazaar. In winter, when the *bukhari* was used to heat the room, they would also use it to cook. The main sources of fuel for heating were wood, cattle dung and thorns - sometimes supplemented by a gas heater. The wood would be both collected but also bought when usage went up in winter. This was considered costly. *"The usage of fuel is very hard for us to afford. During winter... we buy wood twice a year from the bazaar. We spend 10,000 AFN (\$US125) for wood and gas which is very high compared to our income."* Some of the gendered, negative health effects from the fuels in use were discussed by Sadif. *"I am suffering from sore eyes because the smoke produced from wood and animal waste has caused this problem. The rest of my family members are fine and they have not experienced any health problems, neither from fuel, nor from electricity."*



Figure 37 Cooking on the open stove pit with wood, brush and animal dung



Azizullah, the young son in the family, left the house every day at 6am to walk two hours to school. In the afternoons, he did his homework, played football and volleyball and helped look after the chickens. He then did more homework in the evenings.

The Khwaja Chasht household showed the transition in energy usage apparent in many areas across Afghanistan. Wahid concluded, *“Yes, we have been observing vast changes with fuel and energy, as we used to use oil lanterns for lighting and wood and dung for heating, but now we have access to solar energy and gas which has changed our life system a lot and both have brought us a lot of facilities.”*





cooking and heating. Soraya described, *“I use animal dung for cooking, making tea and warming water to wash clothes and take baths.”* In winter, the family did not usually buy fuel for heating. Instead, Javed said, *“we don’t pay money for buying firewood and thorny bushes. Every day, my son goes to collect firewood and thorny bushes from the forest and mountains, and brings firewood for our use.”* The mother and daughter had been sick with respiratory issues and sore eyes, with the blame placed squarely on the dust and smoke from chores and cooking each day.

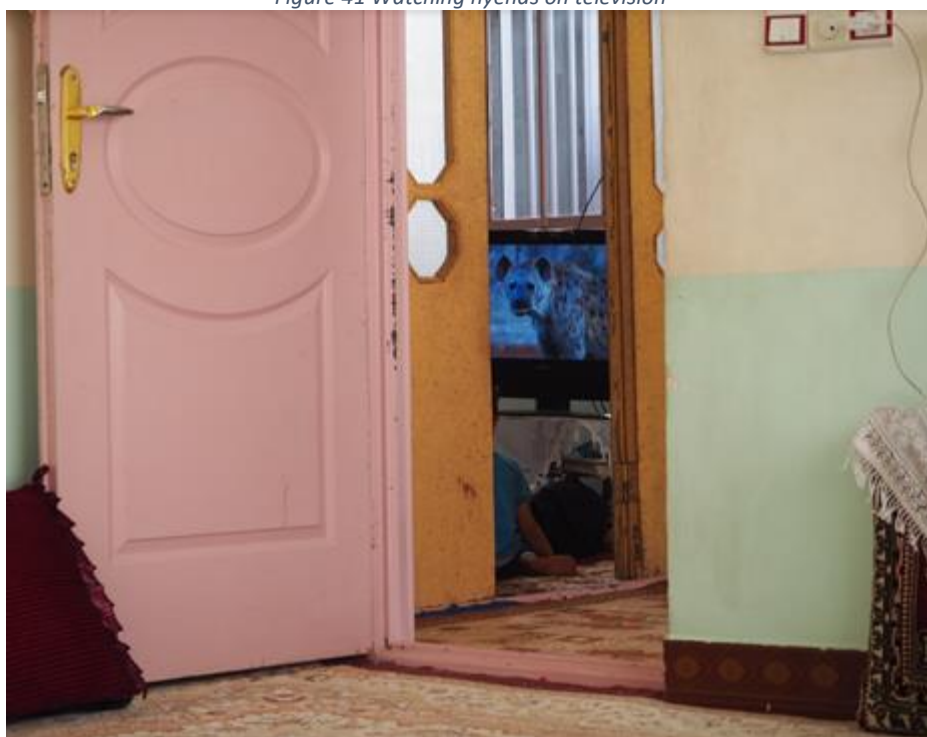
Figure 40 Javed speaking about the family’s energy usage for the seasonal case studies



## H. Jebraeel, Herat

This case study was conducted with a family living in a community in Herat city, called Jebraeel. The household was fairly close to the centre of Herat, and was grid-connected, but not a very rich suburb. The family was large – ten people, including both boys and girls, and the household included Mohammed Naseem’s parents. Interviewed for this case study were Mohammed Naseem, the head of household, his wife, Masooma, and their 15-year-old daughter, Fawzia. Fawzia and her father could read and write, but Masooma could not. Most of the children were in school, but their oldest son and Mohammed Naseem both worked. Masooma stayed home to look after the house. The family were not from Herat originally – they left Ghazni due to insecurity, and while Masooma would have liked to go back, her husband said it was not safe to do so, and they had their house in Herat. They had no plans to return to Ghazni any time soon.

*Figure 41 Watching hyenas on television*



The family had had grid electricity at home for seven years – they said they paid 200,000AFs for the connection, equivalent to about US\$3,000. However, the electricity was expensive, so they still used gas for cooking and heating, to keep the bills down. Towards the end of summers, they would not yet heat the house, but they would be commencing to use the hot water boiler, run by gas that they paid for, refilling their gas cylinders one or twice a month, costing them about \$10 each time. They said their electricity bills were still high.

The family’s day-to-day life was mostly about work and school. Mohammad Naseem goes to work each day, and the children go to school and study afterwards at home in the afternoons and evenings – their father said he helped them, sometimes. They watch television together most evenings. Mohammad Naseem worked in an office – he said his wife does most of the work in the home, but he would help

around the house whenever she was unwell. He wanted to study more, but did not have time. Masooma said she was mostly busy with cooking and cleaning at home. She was married very young, so she didn't go to school for long, but she wished she had the skills to get a job and help the family financially. Sometimes her daughters helped her with chores, but they were in school so could not help all the time. Fawzia studied at a nearby private school in the mornings – she was then in 8th grade. When she was not studying, she played with friends, or worked on her homework. She had some space to herself to study, she said, and used a light to study by when needed. She helped out a little at home, and sometimes cooked or did ironing on the weekends, but because she was studying, did not do too much. Because the family used gas, Fawzia did not need to collect fuel for burning, nor did her mother. Her father and older brother were in charge of keeping the gas bottles filled.

They cooled the house with a fan in summer, or sometimes an air conditioner. They used the fridge regularly when the weather was hot, had the cooler on for six or seven hours a day, and used the grid electricity for all their appliances. In summer, the biggest energy users were the AC, the fridge and their water purifier. Fawzia explained that they often turned the fridge off at night, to help keep the electricity costs down. They had a range of appliances in the house – Masooma also had a vacuum cleaner and other appliances to help clean. Herat city had grid electricity and while the voltage was variable, it was fairly consistently available and outages were usually short. When they had electricity shortages, the family relied on rechargeable torches, and did not have any other backup. All of them liked having a TV, and noted how central it was to family life, and to keeping up with the news. Mohammad Naseem thought this was very important. Masooma and her husband both had phones, and often used them to contact family abroad.

The family did not worry about health impacts from energy – they used gas and not fuels that could be bad for the lungs. In this sense, as an urban family, they were different from many of the other households studied. However, Masooma had a cyst and was often unwell, and sometimes worried because while she tried not to use the cleaning appliances all the time to keep the bills low, it was hard work that strained her. Masooma and one of her daughters could do needlework, but with the housework and school, they usually did not find the time. Mohammed Naseem wanted to open a small bakery at home, and had even invested in equipment but found he could not use the appliances at home – the electricity was not reliable enough to keep them running.

Both Masooma and Mohammed Naseem think that having grid electricity was very good. However, they said that the electricity was not as good as it was previously in Herat, and was more expensive. They were grateful to have it – they remembered their experiences in Ghazni, where grid electricity and the facilities it brought were not common, if available at all. But they worried about the costs for their family. Masooma said they had taken loans to pay their bills – they often paid 4,000 to 5,000AFs, sometimes 6,000AFs – and had some outstanding debt that they must pay off soon. The family were trying to use the water heater less, and Masooma did not use the vacuum then even though cleaning without it exacerbated pain in her back.



## I. Chawghai Village, Aybak District - Samangan

The Saighani family lived in the community of Chawghai, a village located a short distance away from the city centre of Aybak, the provincial capital of Samangan. While just a few minutes' drive from the city centre, Chawghai is still surrounded by agricultural fields which play an important part in the village. Tahir, the head of the Saighani family who took part in the seasonal case studies proudly explained his income sources. *"I am a farmer and I have 12 sheep and 5 acres of land. I have a lot of almond trees in the fields and I cultivate wheat, potatoes and other vegetables. I gained almost 21 kgs of almond this year."* The Saighani family had eight members, Tahir, his wife Saida, and their six children (three daughters and three sons). Saida explained: *"All my children are busy with their studies at school and in the university except my youngest daughter who is 4 years old. My husband is a farmer and my sons are helping him in fields. I take care of all chores in the house. I do tailoring only for my own family."* The family also owned cattle, which Saida milked in the mornings after ablution and prayers, and which provided animal dung as part of the family's fuel mixture. Tahir said the family lineage traced back to Kabul, with their ancestors having moved to Samangan half a century previously. At the time of the seasonal case studies, almost 50 families of the tribe were living in Chawghai village.

Figure 42 The Saighani household yard



The Saighani family were connected to the national electricity grid. The cost was almost the only complaint about their electricity supply, Saida stating that *"since the electric boxes have changed to the digital system, the electricity has become so expensive, which doesn't let us use desired appliances [such as a refrigerator, nor an air conditioner or water boiler]"*. The grid did allow the family a stable supply of electricity for lighting, television, mobile phone charging, an iron and fans for use during summer. The family watched dramas, religious shows and the news on their television. The grid was an upgrade over previous supply. Tahir noted that *"previously we were using a generator, which was getting damaged daily and it was very difficult to manage it."* Anoush, the young son in the family, went to school for three hours each day. They had electricity at their school for lighting, keeping classes cool in summer as well as a computer lab. Apart from playing football in his spare time, Anoush used electricity at home to study, charge his mobile phone and watch entertainment programmes on television.

Figure 43 A television and fan in the room where Saida (front) spoke about the family's energy usage

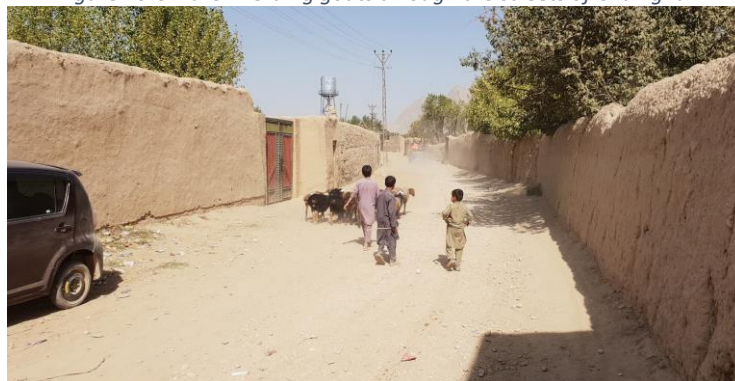


The family mostly used collected wood and animal dung as fuels for cooking (and in winter for heating). They rarely used gas for cooking. In winter, the family supplemented their collected wood and animal dung with coal bought from the bazaar. *"We collect the wood from our garden and fields and it takes us two hours [each day] to gather and bring back to the house. I make the fuel from animal's dung by myself at home,"* said Saida. Along with other chores such as helping in the fields and gardens, bringing the cattle grass and fetching water, Anoush, the young son, helped collect fuel. *"Yes, I bring fuel from fields. Mostly on Fridays when I am home. If it is needed, I bring it twice a week. My father and elder brother collect the fuel and I bring it home."*

Figure 44 Cooking with wood and animal dung in the Saighani family's yard



Figure 45 Children herding goats through the streets of Chawghai





## J. Yakatoot, Rural Samangan

The Anush family live in Yakatoot, in rural Samangan. Close to the main Afghanistan Highway (AH) 76 running between Kabul and Mazar-e Sharif, which also has one of the major grid electricity transmission lines from Central Asia running alongside it, Yakatoot is connected to the grid (although not all villages in the districts in the main valley running through Samangan are). Yakatoot is marked by green fields amidst dry, yellow plains and hills on either side of the wide valley.

Figure 46 Children collecting water in Yakatoot. A major electricity transmission line can be seen to the left.



The Anush family was originally from another village called Chaqmaqali, but moved to Yakatoot many years ago where they currently own their own house, with no plans on moving again. The family had nine members, including the parents, five daughters and two sons. The eldest daughter, Latifa, was staying at home learning the Quran and did not work outside - at the time of the seasonal case studies, she was engaged and her fiancé was in Turkey. Two of the daughters were going to school, but the rest of the children were all too young to go to school. Hadija, the mother of the household did household chores and weaved carpets at home, but only for use by the family instead of for sale, although sometimes she weaved for other villagers in Yakatoot. Hadija explained, *"I take part in cleaning and cooking mostly. My daughters are helping me too, as one of them cooks once a day and the other one is helping me with the cleaning and washing."* Atta, the father of the household, worked as a taxi driver. He would usually drive people from Yakatoot to Aybak City Centre, the Samangan provincial capital, work within the city for a few hours, before driving people back towards Yakatoot to finish his day of work.

*Figure 47 Atta discussing energy during the seasonal case studies*



The family, like almost all households in Yakatoot, was connected to the grid. The television was turned on regularly and was usually watched until 10 PM. The Anush family liked to watch entertainment programs, dramas and news. Along with lighting, the family also used grid electricity for fans and a refrigerator during the hotter months. The family would also charge their mobile phones with the grid electricity. The Anush family praised the high quality of the grid - their main complaint was what they perceived to be the high billing costs and their difficulties in paying for them. The family did not buy some appliances and were limiting the use of the ones they did have. This included highly limited use of boiling water with grid electricity, instead relying on heating it with combustible fire from wood and dung. The family would also often disconnect their refrigerator to keep electricity costs down. The family approximated that they paid AFN2000 (equivalent to about US\$25) on their electricity bills, AFN800 (about US\$10) for gas and AFN500 (US\$6) for wood monthly. Atta bought fuel from the village market. In the rare cases of outages, the family had dry-cell battery torches and their mobile phones for lighting.

*Figure 48 The Anoush family's small fridge*



The family used wood and dung as fuel for cooking. This included the sole use of wood in the *tandoor* clay oven used for baking bread. They noted one sack of dung would cost AFN150 (about \$US2.00), since the family did not have any agricultural fields to collect these themselves. Hadija and Latifa would also heat water for washing clothes and making tea by using wood and dung. The family worried about the health impacts of using wood and dung, complaining about the large amount of smoke that was produced that was considered dangerous for the lungs and eyes.

The Anush family discussed the positive benefits that grid electricity had brought, noting that previously they had experienced more difficult living conditions without electricity and that grid access had brought many amenities and improvements to their household. This included making their daily lives easier and having helped the children in the house be able to study. The young daughter who was at school stated that during the summer, *“this month [in August] we have used the fan because it was really hot, and also, we used the refrigerator for making the water cold and to keep the edible items fresh. We watch TV for entertainment. We can use most of the appliances for 24 hours.”*

Figure 49 Yakatoot School



## Annex 4: Research tools

The research tools included the quantitative baseline surveys (household and business / community institution), the quantitative diary surveys (household and business / community institution), as well as focus group and key informant interview guidelines.

### Quantitative Household Survey Themes

The Quantitative House Surveys focussed on general household demographic information, including household members, economic profile (work, income, spending and assets), literacy rates and migration profile. Energy solutions formed one of the core components of the quantitative survey, with the tool focussing on which energy solutions are in use, how they are used, for what purpose, how they are paid for and issues with energy provision. The energy sections consisted of electricity solutions (such as grid, generator and solar), as well as energy used for cooking, heating and alternative lighting (dry-cell batteries, candles). Health questions were also built into various sections of the survey, including the electricity solutions as well as heating and cooking sections. Another major component of the survey was *willingness to pay* for both grid access and different types of solar energy products, with different kinds of payment setups.

### Quantitative Business Enterprise and Community Institution Survey Themes

The Quantitative Business Enterprise and Community Institution Survey matched the Household Survey in obtaining general information (sector, type of business, size in both staffing and area, years of operation, revenue and expenses) and energy solutions. To find out *how* businesses enterprises and community institutions used their energy, the most important tools for the business and the energy needs for their usage were explored. Willingness and ability to pay for grid and solar solutions were explored in depth.

### Focus Group Discussion Themes

The Focus Group Discussions tool expanded on key sections of the quantitative tools including the intersections of energy and health. Issues and problems, including with access, affordability and utility were highlighted. Household and business enterprise aspirations for energy were explored. How energy affected different genders, and how energy plays a crucial role in women's day-to-day lived-experience also formed a core component of each focus group discussion.

### The Seasonal Case Studies

The seasonal case study tool used an anthropological and ethnographic approach, exploring the energy in the day-to-day lives of participants from their perspective. The tool was used to derive a richer understanding of the socio-economic impacts of energy, as well as a clearer picture of household energy usage dynamics. It was also employed to further understand how and why energy patterns changed across the different seasons.

### The diary surveys

The purpose of the diary was to track energy usage and related experiences among baseline respondents over the course of a year.

## TOOL 1. Baseline Survey for Households

I will now read you a short statement about what this survey involves, and then ask you to give your agreement.

This survey is being done for the World Bank, by our research organisation, Samuel Hall, with the support of the Ministry of Energy and Water. The information we collect will be used to help us understand better what the energy needs are for people across Afghanistan. Your personal information will not be used outside of our research organisation. We will provide you with a small sum of 150AFs in consideration for your time completing this survey, which is about an hour long, with us today. Then over the course of the next year, we will call you for a short 10-15 minute phone survey each month, and these survey that we conduct with you over the next year will not be reimbursed. By saying yes now, you are agreeing to complete the survey with us today, and then to speak to us over the phone once every month for a year afterwards, and you are confirming that the information that you provide to us, including your contact details, is correct.

Do you agree to participate in this survey?

	Question	Answer
<b>I. GENERAL</b>		
1.	Enumerator ID	_____
2.	Enumerator Name	_____
3.	Field Coordinator ID	
4.	Field Coordinator Name	
5.	Province	1. Daikundi 2. Herat 3. Kabul 4. Paktia 5. Samangan
6	Location Daikundi	1. Charkh 2. Ghaf 3. Khuga Chast 4. Sang-e-Mom 5. Sar-e-Nili 6. Qarya Dasht

7.	Location Herat	1. Jebraeel 2. Majghandak 3. Malikiha 4. Naw Abad Shuhadaye 5. Shaalbafaan 6. Qala-e-Sharbat
8.	Location Kabul	1. Dasht-e-Barchi 2. Deh Yahya 3. Karte Naw 4. Khair Khana 5. Langar 6. Shewaki
9.	Location Paktia	1. Baala Deh 2. Bano Zai 3. Habib Kala 4. Mondakhail 5. Nargese 6. Patan Kalai
10.	Location Samangan	1. Chawghai 2. Dawlatabad 3. Lab-e-Aab 4. Mula Qurban 5. Talkhaki 6. Yakatoot
11	Team leader name (Daikundi)	
12	Team leader name (Herat)	
13	Team leader name (Kabul)	
14	Team leader name (Paktia)	
15	Team leader name (Samangan)	
<b>III. RESPONDENT INFORMATION</b>		
1.	Language of interview?	1. Dari 2. Pashto
2.	First name	_____
4	Last name	_____
5	Gender of main respondent	1. Male 2. Female
6	Age of main respondent	



7.	Ethnicity of main respondent	1. Pashtun 2. Uzbek 3. Tajik 4. Hazara 5. Turkmen 777. Other: _____
8.	Is the main respondent literate?	1 Yes 2 No 888. I don't know 999. Refuse to answer
9	Relationship between the main respondent and the head of household?	1. Main respondent is the head of household 2. Main respondent is the spouse of the head of household 3. Main respondent is the child of the head of household 777. Other: _____
10	Main respondent's phone number? <b>Click to confirm the number works</b>	_____
11	Main respondent's second phone number? <b>Click to confirm the number works</b>	
12	Full name of alternative / secondary respondent	_____
13	Is the alternative respondent literate?	1. Yes 2. No 888. I don't know 999. Refuse to answer
14	Age of alternative respondent	_____
15	Gender of alternative respondent	1. Male 2. Female
16	Relationship between the alternative respondent and the head of household?	1. Alternative respondent is the head of household 2. Alternative respondent is the spouse of the head of household 3. Alternative respondent is the child of the head of household 777. Other: _____

17	Alternative household member phone numbers. <b>Collect at least one more phone number. Please double-check the number.</b>	_____
18	Description of the dwelling location / address	_____
<b>IV. – HOUSEHOLD INFORMATION</b>		
1.	How many people live in this household?	
2.	How many adult women (older than 18) are a part of this household?	
3.	How many children under the age of 18 live in this household?	
4.	How many of the children have a source of income?	
5.	How many of the children are in school?	
6.	How many children aged from 7-14 do you have?	
7	Is at least one man in this household literate (16+ years)?	1. Yes 2. No 888. I don't know 999. Refuse to answer
8	Are all men in this household literate (16+ years)?	1. Yes 2. No 888. I don't know 999. Refuse to answer

9.	Is at least one woman in this household literate (16+ years)?	1. Yes 2. No 888. I don't know 999. Refuse to answer
10	Are all women in this household literate (16+ years)?	1. Yes 2. No 888. I don't know 999. Refuse to answer
11.	How many people in this household have a source of income?	
12	What is the occupation of people contributing to the income of this household?	1. Wage Employee, Non-Farm 2. Wage Employee, Farm 3. Self-Employed Non-Farm-Business enterprise 4. Self-Employed Non-Farm-Independent contractor, technician, professional, etc. 5. Self-Employed Agriculture/Livestock 6. Casual/Day Laborer 7. Not working/unemployed (Military pensions/Retired) 8. Remittance from outside of household 777. Other: _____
13	Which sectors do household members contributing to the income of this household work in?	1. Agriculture, forestry and fishing 2. Mining and quarrying 3. Manufacturing 4. Electricity, gas, steam and air conditioning supply 5. Water supply; sewerage, waste management and remediation activities 6. Construction 7. Wholesale and retail trade; repair of motor vehicles and motorcycles 8. Transportation and storage 9. Accommodation and food service activities 10. Information and communication 11. Financial and insurance activities 12. Real estate activities 13. Professional, scientific and technical activities 14. Administrative and support service activities 15. Public administration and defense; compulsory social security 16. Education 17. Human health and social work activities 18. Arts, entertainment and recreation

		777. Other: _____
14	What is the approximate monthly income of this household from all income earners combined? Please answer in Afghanis. Help the respondent add up additional income sources if necessary.	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
15	Does this income change over the course of the year?	<p>1. Yes</p> <p>2. No</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
16	What are the worst months for your household in terms of income-generation?	<p>1. Hamal</p> <p>2. Sawar</p> <p>3. Jawza</p> <p>4. Saratan</p> <p>5. Asad</p> <p>6. Sanbola</p> <p>7. Mezan</p> <p>8. Aqrab</p> <p>9. Qaws</p> <p>10. Jadi</p> <p>11. Dalwa</p> <p>12. Hot</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
17	What is the approximate monthly income of this household in the worst months? (in AFS)	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
18	What is the approximate monthly income of this household in the best months? (in AFS)	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>

19	How would you evaluate your economic status compared to other households in this area?	1. Much better 2. Better 3. The same 4. Worse 5. Much worse 888. I don't know 999. Refuse to answer
20	How would you compare the overall economic situation of your household with one year ago?	1. Much better 2. Better 3. The same 4. Worse 5. Much worse 888. I don't know 999. Refuse to answer
21	Does any household member operate a non-agricultural business from home?	1. Yes 2. No 888. I don't know 999. Refuse to answer
22	What type of business?	1. Tailoring 2. Embroidery 3. Carpet weaving 4. Beauty/hair salon 777. Other: _____
23	Does this household have access to credit/loans, i.e. could you borrow money if you needed to?	1. Yes 2. No 888. I don't know 999. Refuse to answer
24	What are the potential sources of credit/loans? (including non-interest loans)	1. Commercial/government bank 2. Cooperative credit union/SACCO 3. Microfinance institution 4. Rural bank 5. State loan 6. NGO 7. Business firm 8. Employer 9. Moneylender 10. Shop 11. Relative/friend/neighbor

		777. Other: _____
<b>V. – MIGRATION PROFILE</b>		
1.	Is this household a returnee household?	1. Yes 2. No <b>(SKIP TO Q5)</b> 888. I don't know 999. Refuse to answer
2.	If yes, which country did your household live in for more than 3 months before returning to Afghanistan?	1. Iran 2. Pakistan 3. Turkey 4. European Country 777. Other: _____
3.	If yes, how many years were you/your household living in a country outside of Afghanistan for?	_____ 888. I don't know 999. Refuse to answer
4.	If yes, how many years ago did you return to Afghanistan?	_____ 888. I don't know 999. Refuse to answer
5	Is this household an IDP household?	1. Yes 2. No <b>(SKIP TO Q7)</b> 888. I don't know 999. Refuse to answer
6	If yes, how many years ago were you displaced?	_____ 888. I don't know 999. Refuse to answer
7	Does anyone in this household move to another place for work regularly, for instance to get construction work or to work on the fields?	1. Yes 2. No 888. I don't know 999. Refuse to answer



8	Do you think it is likely that you and your household will remain living in this town / village for the foreseeable future?	1. Yes 2. No 888. I don't know 999. Refuse to answer
9	Do you think it is likely that you and your household will remain living in this dwelling for the foreseeable future?	1. Yes 2. No 888. I don't know 999. Refuse to answer
<b>HOUSEHOLD DWELLING</b>		
1.	How many years have you been living in this community?	_____ 888. I don't know 999. Refuse to answer
2	What is the distance between this dwelling and the nearest road? In meters	_____ 888. I don't know 999. Refuse to answer
3	How long does it take to walk to the nearest road? In minutes, verify through observation	_____ 888. I don't know 999. Refuse to answer
4	Is this your main dwelling?	1. Yes 2. No 888. I don't know 999. Refuse to answer
5	What is the type of dwelling?	1. A single-story house occupied by one household 2. A single-story house occupied by multiple households 3. Multi-storied building with one household 4. Multi-storied building with more than one households 5. Group of enclosed dwellings occupied by multiple households 6. Group of enclosed dwellings occupied by a single household 777. Other: _____

6	Does your household own this dwelling?	1. Yes <b>SKIP TO Q18</b> 2. No 888. I don't know 999. Refuse to answer
7	If no, do you use it for free or rent it?	1. Free 2. Rented <b>SKIP TO Q17</b>
8	IF RENTED: How much do you pay monthly to rent this dwelling? <b>In</b> <b>Afghanis, if another currency is given, please convert</b>	_____ 888. I don't know 999. Refuse to answer
9	The walls of the dwelling are mainly made of what material?	1. Fired brick/stone 2. Concrete/cement 3. Mud bricks/mud 4. Stone/mud 777. Other: _____
10	The roof of the dwelling is mainly made of what material?	1. Concrete (with metal) 2. Wood / wood with mud 3. Tin / metal 4. Girder with fired brick 777. Other: _____
11	What type of toilet facility does your household use?	1. None (open field) 2. Toilet on water 3. Flush to sewage 4. Flush to septic tank 5. Pail/Bucket 6. Covered pit latrine 7. Uncovered pit latrine 8. Community latrine 777. Other: _____
12	What is your household's main source of drinking water?	1. Pipe borne water treated 2. Pipe borne water untreated 3. Bore hole/ hand pump 4. Well/hand pump 5. Electric water pump 6. Well/spring protected 7. Well/spring unprotected 8. Well/spring unprotected

		9. River/spring 10. Lake/reservoir 11. Rain water 12. Tanker/truck/vendor 13. Sachet water 14. Bottle water 777. Other: _____
<b>GRID</b>		
1	Is the household connected to the national electricity grid?	1. Yes 2. No <b>SKIP TO Q28</b> 888. I don't know 999. Refuse to answer
2	In the last 12 months, was grid electricity the PRIMARY energy source for your household?	1. Yes 2. No <b>SKIP TO Q3</b> 888. I don't know 999. Refuse to answer
3	Why isn't the grid the primary source of electricity in the household?	1. Connection is broken and not working 2. Supply has been cut by the utility because of unpaid bills 3. Supply has been cut by the utility because of unpaid bills 4. Cannot power large appliances 5. Too expensive 6. Low / high voltage problems or fluctuations 7. Unpredictable interruptions 777. Other <b>(specify)</b> 888. I don't know 999. Refuse to answer
4	How many years have you had this grid connection?	_____ 888. I don't know 999. Refuse to answer
5	How much did your household pay for the grid connection fee?	_____ 888. I don't know 999. Refuse to answer

6	Who did you pay for the grid connection?	<ol style="list-style-type: none"> <li>1. Electricity company / utility (i.e. DABS)</li> <li>2. Electrician</li> <li>3. Landlord</li> <li>4. Neighbour</li> <li>5. Community/village/municipality</li> <li>6. No one/we did not pay for the grid connection</li> <li>777. Other (specify)</li> </ol> <p>888. I don't know</p> <p>999. Refuse to answer</p>
7	Who do you currently pay for your electricity service?	<ol style="list-style-type: none"> <li>1. Energy company / utility (i.e. DABS)</li> <li>2. Other energy provider/business</li> <li>3. Community/village/municipality</li> <li>4. Relative</li> <li>5. Neighbour</li> <li>6. Landlord</li> <li>7. No one</li> <li>8. Someone outside the utility</li> <li>777. Other (specify)</li> </ol> <p>888. I don't know</p> <p>999. Refuse to answer</p>
8	Does your household have a working electricity meter?	<ol style="list-style-type: none"> <li>1. Yes, we have a working meter</li> <li>2. Yes, we have a meter but it does not work</li> <li>3. No, we do not have a meter</li> </ol> <p>888. I don't know</p> <p>999. Refuse to answer</p>
9	Is your electricity meter shared by any other households or dwellings?	<ol style="list-style-type: none"> <li>1. No, we have our own meter</li> <li>2. Yes, we share the meter with other households / dwellings</li> </ol>
10	If your electricity meter is shared, how many other households or dwellings do you share it with?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
11	How are you billed for electricity? Ask to see the last bill.	<ol style="list-style-type: none"> <li>1. Fixed regular fee (i.e. monthly, every two months)</li> <li>2. Charged by number of lights/appliances</li> <li>3. Charged based on kWh</li> <li>4. Charged based on utility estimated consumption</li> </ol>

		<p>777. Other (specify)</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
12	How often does your electricity bill come / what period does it cover?	<p>1. Every two weeks</p> <p>2. Every month</p> <p>3. Every six weeks</p> <p>4. Every two months</p> <p>5. Every three months</p> <p>6. Every four months</p> <p>7. I can pay as often as I want</p> <p>777. Other (specify)</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
13	How do you make your electricity bill payment?	<p>1. Cash</p> <p>2. Pay at the bank</p> <p>3. Credits using mobile money</p> <p>4. Pay at the utility office</p> <p>5. Vouchers from local store</p> <p>6. Pay at the post office</p> <p>777. Other (specify)</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
14	How much were you charged for the most recent billing period of electricity on your bill? (in AFN) Calculate amount paid from the last bill if available.	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
15	In the last billing period how much electricity did your household use? (in kWh) Calculate amount from the last bill if available.	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
16	Is the performance of electricity supply the same all year? (i.e. do you always	<p>1. Yes</p> <p>2. No</p>



	have the same amount of power available?)	888. I don't know 999. Refuse to answer
17	What are the worst months for service from the grid to your household? Please indicate the worst month or two.	<ol style="list-style-type: none"> <li>1. January</li> <li>2. February</li> <li>3. March</li> <li>4. April</li> <li>5. May</li> <li>6. June</li> <li>7. July</li> <li>8. August</li> <li>9. September</li> <li>10. October</li> <li>11. November</li> <li>12. December</li> <li>13. Every month</li> </ol> 888. I don't know 999. Refuse to answer
18	How many hours of electricity are (typically) available each day and night from the grid? (max 24 hours)	<p>_____</p> 888. I don't know 999. Refuse to answer
19	How many hours of electricity are (typically) available each evening between 6pm to 10pm from the grid?	<p>_____</p> 888. I don't know 999. Refuse to answer
20	How many hours of electricity do you use in total over one full day (24 hour period) from the grid?	<p>_____</p> 888. I don't know 999. Refuse to answer
21	On average, how many electricity unannounced/unexpected outages occur in one week?	<p>_____</p> 888. I don't know 999. Refuse to answer

22	If you add up all the time, approximately how many hours do you not have electricity due to outages in an average day?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
23	What is your main back-up source of lighting during outages/blackouts of the grid?	<ol style="list-style-type: none"> <li>1. Generator</li> <li>2. Battery and storage devices (e.g. car battery)</li> <li>3. Solar home system</li> <li>4. Solar lantern / lighting system</li> <li>5. Kerosene lamp</li> <li>6. Candle</li> <li>7. Torch/flashlight</li> <li>8. Rechargeable torch</li> <li>9. LPG lamp</li> <li>10. No backup source</li> </ol> <p>777. Other (specify)</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
24	What is your main back-up for powering appliances during outages/blackouts of the grid?	<ol style="list-style-type: none"> <li>1. Generator</li> <li>2. Battery and Storage Devices (e.g.: car battery)</li> <li>3. Solar Home System</li> <li>4. No back-up source</li> </ol> <p>777. Other (specify)</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
25	What are the most serious problems you experience with your grid electricity?	<ol style="list-style-type: none"> <li>1. Supply Shortage/not enough hours of electricity</li> <li>2. Cannot power large appliances</li> <li>3. Too expensive</li> <li>4. Meter reading issues/corruption</li> <li>5. Low / high voltage problems or fluctuations</li> <li>6. Unpredictable interruptions</li> <li>7. It is dangerous, people can get injured</li> <li>8. No problems</li> </ol> <p>777. Other (specify)</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
26	In the last 12 months, did any of your appliances get damaged because the	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol> <p>888. I don't know</p>

	voltage was going up and down from the grid?	999. Refuse to answer
27	In the last 12 months, did any household members die or have permanent limb (bodily injury) damage because of the grid electricity?	1. Yes 2. No 888. I don't know 999. Refuse to answer
28	What is the MAIN reason why your household is not connected to the grid?	1. Grid is too far from household/not available 2. Cost of initial connection is too expensive 3. Regular costs are too expensive 4. Satisfied with current energy solution 5. Renting, Landlord decision 6. Service Unreliable 7. Administrative procedure is too complicated 8. Submitted application and waiting for connection 9. Company refused to connect the household 777. Other (specify)
29	Do you expect to get a grid connection in the future?	1. Yes 2. No 888. I don't know 999. Refuse to answer
30	In how many years do you expect to get grid connection?	_____ 888. I don't know 999. Refuse to answer
<b>MINI-GRID</b>		
1	Is this household connected to the mini-grid? Enumerators, please explain if necessary – a mini-grid is a set of electricity generators and possibly energy storage systems connected together to make a network that supplies electricity to a small group of people, like a community or village	1. Yes 2. No

2	Can you tell me how this mini-grid is powered?	1. Solar power 2. Wind power 3. Hydro power 4. Diesel/petrol engine power 777. Other (specify) 888. I don't know 999. Refuse to answer
3	In the last 12 months, was your mini-grid connection the PRIMARY energy source for your household?	1. Yes SKIP TO Q5 2. No 888. I don't know 999. Refuse to answer
4	Why isn't the mini-grid the primary source of electricity in the household?	1. Connection is broken and not working 2. Supply has been cut by the utility because of unpaid bills 3. Supply Shortage/not enough hours of electricity 4. Cannot power large appliances 5. Too expensive 6. Low / high voltage problems or fluctuations 7. Unpredictable interruptions 777. Other (specify) 888. I don't know 999. Refuse to answer
5	Is there a limit for the load and/or appliances you are allowed to power from this mini-grid?	1. Yes 2. No 888. I don't know 999. Refuse to answer
6	What is the limit for the load and/or appliances you are allowed to power from this mini-grid? Note unit of measurement	_____ 888. I don't know 999. Refuse to answer
7	What is the name of the local mini-grid company or provider?	888. I don't know 999. Refuse to answer

8	How much did your household pay for the mini-grid connection fee?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
9	Who do you currently pay for your electricity service?	<p>1. Electricity company / utility</p> <p>2. Electrician</p> <p>3. Landlord</p> <p>4. Neighbour</p> <p>5. Community / village / municipality</p> <p>6. No one / we did not pay for the grid connection (someone else paid, it was free)</p> <p>777. Other (specify)</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
10	Does your household have an electricity meter?	<p>1. Yes, we have an operational meter</p> <p>2. Yes, we have a meter but it is not operational</p> <p>3. No, we do not have a meter</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
11	Is your electricity meter shared with other households?	<p>1. No</p> <p>2. Yes, we share our meter with other businesses / institutions</p> <p>3. Yes, we share our meter with other households</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
12	How many other businesses/institutions/households do you share it with?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
13	How are you billed for electricity? Please ask to see the last bill	<p>1. Fixed regular fee</p> <p>2. Charged based on lights and appliances used</p> <p>3. Charged based on utility estimated consumption</p> <p>4. Charged based on kWh</p> <p>5. Pay for spare parts/maintenance</p> <p>777. Other (specify)</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>



14	How do you make your electricity bill payment?	<ol style="list-style-type: none"> <li>1. Cash</li> <li>2. Vouchers from local store</li> <li>3. Credits using mobile money</li> <li>4. Pay at utility office</li> <li>5. Pay at the bank</li> <li>6. Pay at the post office</li> <li>777. Other (specify)</li> </ol> <p>888. I don't know</p> <p>999. Refuse to answer</p>
15	How often does your electricity bill come / what period does it cover?	<ol style="list-style-type: none"> <li>1. Every two weeks</li> <li>2. Every month</li> <li>3. Every six weeks</li> <li>4. Every two months</li> <li>5. Every three months</li> <li>6. Every four months</li> <li>777. Other (specify)</li> </ol> <p>888. I don't know</p> <p>999. Refuse to answer</p>
16	How much were you charged for the most recent billing period of electricity on your bill? Give answer in Afghanis	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
17	In the last billing period how much energy did your business / institution use? Give answer in kWh	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
18	Is the performance of electricity supply the same all year? [i.e. do you always have the same amount of power available, or does it change from month to month?]	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol> <p>888. I don't know</p> <p>999. Refuse to answer</p>

19	What are the worst months for service from the grid to your household? <b>Select one or two</b>	1. January 2. February 3. March 4. April 5. May 6. June 7. July 8. August 9. September 10. October 11. November 12. December 13. Every month 888. I don't know 999. Refuse to answer
20	How many hours of electricity are available each day and night from the minigrid? (max 24 hours)	_____ 888. I don't know 999. Refuse to answer
21	How many hours of electricity are AVAILABLE each day and night from the mini-grid (over maximum 24 hours) in a typical month for electricity?	_____ 888. I don't know 999. Refuse to answer
22	How many hours of electricity are AVAILABLE each evening between 6pm and 10pm from the mini-grid in a typical month for electricity?	_____ 888. I don't know 999. Refuse to answer
23	How many hours of electricity do you USE in total over one full day (24 hour period) from the mini-grid in a typical month?	_____ 888. I don't know 999. Refuse to answer
24	On average, how many electricity unannounced/unexpected outages occur in one week?	_____ 888. I don't know 999. Refuse to answer

25	If you add up all the time, approximately how many hours do you not have electricity due to outages in an average DAY? (Hours)	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
26	What is your main back-up source of LIGHTING during outages / blackouts from the mini grid?	<ol style="list-style-type: none"> <li>1. Generator</li> <li>2. Battery and storage devices (e.g. car battery)</li> <li>3. Solar home system</li> <li>4. Solar lantern / lighting system</li> <li>5. Kerosene lamp</li> <li>6. Candle</li> <li>7. Torch/flashlight</li> <li>8. Rechargeable torch</li> <li>9. LPG lamp</li> <li>10. No backup source</li> </ol> <p>777. Other (specify)</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
27	What is your main back-up for powering appliances during outages/blackouts of the minigrid?	<ol style="list-style-type: none"> <li>1. Generator</li> <li>2. Battery and Storage Devices (e.g.: car battery)</li> <li>3. Solar Home System</li> <li>4. No back-up source</li> </ol> <p>777. Other (specify)</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
28	What are the most serious problems you experience with your mini grid electricity? Select up to two choices	<ol style="list-style-type: none"> <li>1. Supply Shortage/not enough hours of electricity</li> <li>2. Cannot power large appliances</li> <li>3. Too expensive</li> <li>4. Meter reading issues/corruption</li> <li>5. Low / high voltage problems or fluctuations</li> <li>6. Unpredictable interruptions</li> <li>7. It is dangerous, people can get injured</li> <li>8. No problems</li> </ol> <p>777. Other (specify)</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
29	In the last 12 months, did any of your appliances get damaged because the	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol> <p>888. I don't know</p>

	voltage was going up and down from the minigrid?	999. Refuse to answer
30	In the last 12 months, did any household members die or have permanent limb (bodily injury) because of the minigrid electricity?	1. Yes 2. No 888. I don't know 999. Refuse to answer
<b>VII. ELECTRIC GENERATOR</b>		
1	In the last 12 months, did the household use a generator that is powered by fuel?	1. Yes 2. No 888. I don't know 999. Refuse to answer
2	In the last 12 months, was generator power the PRIMARY energy source for this household?	1. Yes 2. No 888. I don't know 999. Refuse to answer
3	How many generators does your business/institution use to supply electricity?	_____ 888. I don't know 999. Refuse to answer
4	Is your generator shared by any other households?	1. Yes 2. No 888. I don't know 999. Refuse to answer
5	How many households share this generator (including yours)?	_____ 888. I don't know 999. Refuse to answer
6	What is the capacity of the generator? In kW preferable	_____ 888. I don't know 999. Refuse to answer

7	In the last 12 months, in which months did you use the generator the most?	1. January 2. February 3. March 4. April 5. May 6. June 7. July 8. August 9. September 10. October 11. November 12. December 13. Every month 888. I don't know 999. Refuse to answer
8	In the last 12 months, what did your household use this generator for?	1. Lighting 2. Appliances 3. Charging Mobile phones 4. Home-based income activity 5. Watching TV 777. Other (specify)
9	How many days per week did you typically use the generator?	_____ 888. I don't know 999. Refuse to answer
10	How many years have you used this generator for?	_____ 888. I don't know 999. Refuse to answer
11	Does your household own the generator?	1. Yes 2. No 888. I don't know 999. Refuse to answer
12	Who owns the generator?	1. Other household 2. A business 3. Community organization 4. Private person/entity 777. Other (specify)

13	Do you rent the generator or use it for free?	1. Rent 2. Use for free 888. I don't know 999. Refuse to answer
14	How do you pay for electricity services from the generator?	1. Cash 2. Vouchers from local store 3. Credits using mobile money 4. Pay at utility office 5. Pay at the bank 6. Pay at the post office 777. Other (specify) 888. I don't know 999. Refuse to answer
15	In the months that you used it, how much do you typically pay to use the generator each month? Do not include any cost of fuel, only fee for using the GENERATOR	_____ 888. I don't know 999. Refuse to answer
16	How much did you pay to purchase the generator? In AFS	_____ 888. I don't know 999. Refuse to answer
17	In the last 12 months, how much did you pay for repairs/parts/maintenance of the generator? In AFS	_____ 888. I don't know 999. Refuse to answer
18	What fuel is used to power the generator?	1. Diesel 2. Gasoline/petrol 777. Other (specify) 888. I don't know 999. Refuse to answer



19	In the last 30 days, what was the total quantity of fuel used to power the generator? <b>Amount in litre</b>	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
20	What is the price per litre for fuel currently? <b>Amount in Afghanis</b>	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
21	In the last 30 days, how much did your business / institution spend on fuel for this generator? <b>Enumerators - please help them add up how much this is if necessary</b>	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
22	Are there certain months / seasons every year when less fuel is available to power the generator?	<p>1. Yes</p> <p>2. No</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
23	What are the worst months of fuel availability for the generator? <b>Select multiple (one or two answers).</b>	<p>1. January</p> <p>2. February</p> <p>3. March</p> <p>4. April</p> <p>5. May</p> <p>6. June</p> <p>7. July</p> <p>8. August</p> <p>9. September</p> <p>10. October</p> <p>11. November</p> <p>12. December</p> <p>13. Every month</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>

24	On average, how many hours do you actually use this generator each day? (max 24 hours)	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
25	On average, how many hours do you actually use this generator each evening between 6pm to 10pm?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
26	Which appliances do you power using a generator?	<ol style="list-style-type: none"> <li>1. Mobile phones</li> <li>2. Computers or tablets</li> <li>3. Water boiler</li> <li>4. Radio</li> <li>5. Television</li> <li>6. Fan</li> <li>7. Refridgerator</li> <li>8. Washing Machine</li> <li>9. Water-pump</li> <li>10. Air conditioner</li> <li>11. Cooking appliances</li> <li>12. Heaters or other heating devices (including water boilers)</li> </ol> <p>777. Other (specify)</p>
27	What are the most serious problems you experience with your generator?	<ol style="list-style-type: none"> <li>1. Supply Shortage/not enough hourse of electricity</li> <li>2. Cannot power large appliances</li> <li>3. Too expensive</li> <li>4. Meter reading issues/corruption</li> <li>5. Low / high voltage problems or fluctuations</li> <li>6. Unpredictable interruptions</li> <li>7. It is dangerous, people can get injured</li> <li>8. No problems</li> </ol> <p>777. Other (specify)</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
<b>RECHARGEABLE BATTERY</b>		
1	In the last 12 months, did the household use a rechargeable battery to supply electricity? Please make sure the respondent does not include batteries charged via solar power here. Please also make sure that the respondent	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>

	understands we are only talking about big rechargeable batteries here that can power more than a light.	
2	In the last 12 months, was rechargeable battery power the PRIMARY energy source for your household?	1. Yes 2. No 888. I don't know 999. Refuse to answer
3	How many batteries do you have?	_____ 888. I don't know 999. Refuse to answer
4	In the last 12 months, what did your business/institution use rechargeable batteries for? Multiple answers	1. Electronic devices (phones, computers... ) 2. Equipment with a motor (pumps, drill machines, sewing machine...) 3. Space heating (local or central) 4. Product and water heating (cooking, ironing, welding...) 5. Space cooling (fans, airconditioners...) 6. Product cooling (refridgerators and freezers) 7. Lighting 777. Other (specify) 888. I don't know 999. Refuse to answer
5	Does your business/institution have an inverter that allows you to use AC appliances?	1. Yes 2. No
6	What is the capacity of the inverter? Please note capacity and unit of measurement given	_____ 888. I don't know 999. Refuse to answer
7	Now we would like to get some information on each of your batteries. Enumerators, please ask to see batteries, and then ask the following	

	<p>questions about each of their batteries. You should repeat this group for each battery - for example, if they said they have two batteries, please repeat it twice. If the respondents are unsure of answers, please look at the batteries yourself to see if possible, or ask them to estimate.</p>	
8	<p>What is the capacity of this rechargeable battery? Please answer in ampere hours (Ah)</p>	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
9	<p>What is the voltage of the rechargeable battery? Please give the amount in watts</p>	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
10	<p>What is the cost to purchase the rechargeable battery? Amount in Afghanis</p>	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
11	<p>Where recharge these batteries?</p>	<p>1. At home</p> <p>2. Shop in the community</p> <p>3. Shop outside the community</p> <p>4. Neighbour</p> <p>777. Other (specify)</p>
12	<p>Do you pay to recharge the battery (using electricity provided by someone else)?</p>	<p>1. Yes</p> <p>2. Yes, some but not all</p> <p>3. No</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
13	<p>How much does your business/institution spend in a typical month to recharge the batteries? Amount in Afghanis</p>	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>

14	<p>What is the electricity source used to recharge the battery?</p> <p>Select multiple</p>	<ol style="list-style-type: none"> <li>1. National grid</li> <li>2. Local mini-grid</li> <li>3. Electric generator</li> <li>4. Solar</li> <li>777. Other (specify)</li> </ol> <p>888. I don't know</p> <p>999. Refuse to answer</p>
15	<p>How many hours on average do you actually USE rechargeable batteries for electricity supply in a 24-hour period?</p>	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
16	<p>How many hours on average do you use batteries for electricity supply each evening from 6pm to 10pm?</p>	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
17	<p>Which appliances do you power using batteries?</p>	<ol style="list-style-type: none"> <li>1. Mobile phones</li> <li>2. Computers or tablets</li> <li>3. Water boiler</li> <li>4. Radio</li> <li>5. Television</li> <li>6. Fan</li> <li>7. Refridgerator</li> <li>8. Washing Machine</li> <li>9. Water-pump</li> <li>10. Air conditioner</li> <li>11. Cooking appliances</li> <li>12. Heaters or other heating devices (including water boilers)</li> <li>777. Other (specify)</li> </ol>
18	<p>What are the most serious problems you experience with your rechargeable batteries?</p>	<ol style="list-style-type: none"> <li>1. Supply Shortage/not enough hourse of electricity</li> <li>2. Cannot power large appliances</li> <li>3. Too expensive</li> <li>4. Meter reading issues/corruption</li> <li>5. Low / high voltage problems or fluctuations</li> <li>6. Unpredictable interruptions</li> <li>7. It is dangerous, people can get injured</li> <li>8. No problems</li> <li>777. Other (specify)</li> </ol>

		888. I don't know 999. Refuse to answer
<b>PICO-HYDRO</b>		
1	In the last 12 months, did your household use a pico-hydro system for electricity? <b>show picture and explain if necessary</b>	1. Yes 2. No 888. I don't know 999. Refuse to answer
2	In the last 12 months, was pico-hydro power the PRIMARY energy source for your household?	1. Yes 2. No 888. I don't know 999. Refuse to answer
3	Why isn't the Pico-Hydro the primary source of electricity in the household?	1. Connection is broken and not working 2. Supply has been cut by the utility because of unpaid bills 3. Supply Shortage/not enough hours of electricity 4. Cannot power large appliances 5. Too expensive 6. Low / high voltage problems or fluctuations 7. Unpredictable interruptions 777. Other <b>(specify)</b> 888. I don't know 999. Refuse to answer
4	Do you share this pico-hydro with other households?	1. Yes 2. No 888. I don't know 999. Refuse to answer
5	How many households are sharing electricity from this pico-hydro?	_____ 888. I don't know 999. Refuse to answer
6	What is the capacity of the pico-hydro system? <b>Please answer in Watts</b>	_____



		<p>888. I don't know</p> <p>999. Refuse to answer</p>
7	<p>In the last 12 months, in which months did you use the pico-hydro system?</p> <p>Select all that apply.</p>	<p>1. January</p> <p>2. February</p> <p>3. March</p> <p>4. April</p> <p>5. May</p> <p>6. June</p> <p>7. July</p> <p>8. August</p> <p>9. September</p> <p>10. October</p> <p>11. November</p> <p>12. December</p> <p>13. Every month</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
8	<p>In the last 12 months, what did your household use this pico-hydro for?</p>	<p>1. Lighting</p> <p>2. Appliances</p> <p>3. Home-based income activity</p> <p>4. Watching TV</p> <p>777. Other (specify)</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
9	<p>How many years has your household used this pico-hydro system?</p>	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
10	<p>Is your household responsible for maintaining the pico-hydro system?</p>	<p>1. Yes, we maintain it physically (repairs)</p> <p>2. Yes, we have to pay to maintain it</p> <p>3. No</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
11	<p>Does your household own the pico-hydro generator?</p>	<p>1. Yes, in part (SKIP TO Q14)</p> <p>2. Yes, entirely (SKIP TO Q14)</p> <p>3. No</p> <p>888. I don't know</p>

		999. Refuse to answer
12	Who owns the pico-hydro ?	1. Other business, institution or household 2. Community organisation 3. Private person / entity (including landlord, rental company, etc.) 777. Other (specify)
13	Do you rent the pico-hydro or use it for free?	1. Rent 2. Use for free 888. I don't know 999. Refuse to answer
14	How do you pay for electricity service from the pico-hydro system?	1. Fixed payment (i.e. per month or week) 2. Charge by number of lights/appliances 3. Charge per kWh 4. Pay for fuel only 777. Other (specify) 888. I don't know 999. Refuse to answer
15	How much do you pay to use the pico-hydro system each month? Do not include any cost of fuel, only fee for using the GENERATOR.	_____ 888. I don't know 999. Refuse to answer
16	How much did you pay to purchase or construct the pico-hydro system?	_____ 888. I don't know 999. Refuse to answer
17	In the last 12 months, how much did you pay for repairs/parts/maintenance of the pico-hydro?	_____ 888. I don't know 999. Refuse to answer

18	Are there certain months/seasons every year when less water is available for the pico-hydro system?	1. Yes 2. No 888. I don't know 999. Refuse to answer
19	What are the worst months (dry season) for the pico-hydro system? <b>Select multiple (one or two answers).</b>	1. January 2. February 3. March 4. April 5. May 6. June 7. July 8. August 9. September 10. October 11. November 12. December 13. Every month 888. I don't know 999. Refuse to answer
20	In a typical month, how many hours do you use the pico-hydro system each day (24 hour period)? <b>Answer cannot exceed 24 hours</b>	_____ 888. I don't know 999. Refuse to answer
21	In a typical month, how many hours of electricity are available each evening from the pico-hydro (6pm-10pm)?	_____ 888. I don't know 999. Refuse to answer
22	What are the most serious problems you experience with your pico-hydro ?	1. Supply Shortage/not enough hours of electricity 2. Cannot power large appliances 3. Too expensive 4. Meter reading issues/corruption 5. Low / high voltage problems or fluctuations 6. Unpredictable interruptions 7. It is dangerous, people can get injured 8. No problems 777. Other <b>(specify)</b> 888. I don't know 999. Refuse to answer

<b>SOLAR</b>		
1	In the last 12 months, did this household use a Solar Home System and/or any Solar Lanterns/Lighting Systems	1. Yes 2. No <b>SKIP TO NEXT SECTION</b> 888. I don't know 999. Refuse to answer
2	Is solar energy your main source of lighting / electricity?	1. Yes 2. No 888. I don't know 999. Refuse to answer
3	Why isn't the solar system the primary source of electricity in the household?	1. Connection is broken and not working 2. Supply Shortage/not enough hours of electricity 3. Cannot power large appliances 4. Too expensive 5. Low / high voltage problems or fluctuations 6. Unpredictable interruptions 777. Other <b>(specify)</b> 888. I don't know 999. Refuse to answer
4	How many solar home systems (SHS) do you have? <b>Give description of SHS and show photo.</b>	_____ 888. I don't know 999. Refuse to answer
5	What is their capacity? <b>in ampere hours (Ah)</b>	_____ 888. I don't know 999. Refuse to answer
6	How many solar lighting systems do you have? <b>Give description of SHS and show photo.</b>	_____ 888. I don't know 999. Refuse to answer

7	How many solar lanterns do you have? <b>Give description and show photo.</b>	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
8	What is your main solar device?	<p>1. Solar home system</p> <p>2. Solar lighting system</p> <p>3. Solar lantern</p> <p>777. Other <b>(specify)</b></p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
9	What is the manufacturer and/or model of your main solar device?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
10	How many light bulbs are there (that can be separated from each other)?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
11	What is the width of the solar panel? <b>Please give answer in centimetres (cm)</b>	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
12	What is the length of the solar panel? <b>Please give answer in centimetres (cm)</b>	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
13	What is the capacity of the battery? <b>Please give answer in kilowatts (kW)</b>	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>

14	What is the capacity of the battery? Please give answer in ampere hours (Ah)	_____ 888. I don't know 999. Refuse to answer
15	Do you have an inverter to be used in conjunction with the solar power device(s)?	1. Yes 2. No
16	How many years have you had the main solar device?	_____ 888. I don't know 999. Refuse to answer
17	How did you get your main solar device?	1. Bought 2. Rent/pay fee to use 3. Came with the house/apartment 4. Received for free 777. Other (specify) 888. I don't know 999. Refuse to answer
18	How much did you pay for your main solar device?	_____ 888. I don't know 999. Refuse to answer
19	Did you receive information and training on the main solar device?	1. Yes 2. No
20	Compared to the first time you used solar lighting, do you currently: Single answer	1. Use more solar lighting 2. Use about the same amount of solar lighting 3. Use less solar lighting
21	In the last 12 months, in which months was service available from the main solar device?	1. January 2. February 3. March 4. April 5. May 6. June 7. July



		8. August 9. September 10. October 11. November 12. December 13. Every month 888. I don't know 999. Refuse to answer
22	How many hours of service is available from the main solar device each day (over a 24 hour period)? <b>Answer cannot exceed 24 hours.</b>	 888. I don't know 999. Refuse to answer
23	How many hours of service is available from the main solar device in the evening from 6pm-10pm? <b>Answer should be maximum 4 hours</b>	 888. I don't know 999. Refuse to answer
24	In the last 12 months, what did your business/institution use solar power for? <b>Select multiple</b>	1. Lighting 2. Appliances 3. Home-based income activity 4. Watching TV 777. Other <b>(specify)</b> 888. I don't know 999. Refuse to answer
25	Which appliances do you power using solar power?	1. Mobile phones 2. Computers or tablets 3. Water boiler 4. Radio 5. Television 6. Fan 7. Refridgerator 8. Washing Machine 9. Water-pump 10. Air conditioner 11. Cooking appliances 12. Heaters or other heating devices (including water boilers)

		777. Other (specify)
26	What are the most serious problems you experience with the main solar device? Select up to 2	<ol style="list-style-type: none"> <li>1. Supply Shortage/not enough hours of electricity</li> <li>2. Cannot power large appliances</li> <li>3. Too expensive</li> <li>4. Meter reading issues/corruption</li> <li>5. Low / high voltage problems or fluctuations</li> <li>6. Unpredictable interruptions</li> <li>7. It is dangerous, people can get injured</li> <li>8. No problems</li> <li>777. Other (specify)</li> </ol> <p>888. I don't know</p> <p>999. Refuse to answer</p>
<b>WILLINGNESS TO PAY</b>		
1	How much money did your household spend on food over the past seven days? In AFN	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
2	How much money did your household spend on communication (mobile phone, internet...) over the past month? In AFN	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
3	How much money did your household spend on housing over the past month?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
4	How much money did your household spend on school fees / educational expenses over the past month? In AFN	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
5	How much money did your household spend on medicine and healthcare expenditures over the past month? In AFN	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>

6	How much money did your household spend on clothing / shoes over the past year? <b>In AFN</b>	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
7	How much money did your household spend on clothing / shoes over the past year? <b>In AFN</b>	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
8	Would you be willing/able to pay $\$ \{wtp\_thresh\_grid\_once\}$ for your house to be connected to the electrical grid tomorrow, if it were possible? <b>the screen will show a random number between 0 and the maximum price in order to allow the research team to estimate a demand curve for the uptake of a given service.</b>	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
9	Would you be willing / able to pay MAX AFS 5,200 per month for this household to be connected to the electrical grid if you could space the payment out over six months? <b>the screen will show a random number between 0 and the maximum price in order to allow the research team to estimate a demand curve for the uptake of a given service.</b>	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
10	How much do you think it would cost to hire an electrician to do all the internal electrical wiring in your house?	<ol style="list-style-type: none"> <li>1. Less than AFN 2000</li> <li>2. AFN 2000 - AFN 3000</li> <li>3. AFN 3000-AFN 4000</li> <li>4. AFN 4000-AFN 5000</li> <li>5. More than AFN 5000</li> </ol> <p>888. I don't know</p> <p>999. Refuse to answer</p>
11	How much do you think you would spend each month for electricity if you	<ol style="list-style-type: none"> <li>1. Less than AFN 500</li> <li>2. AFN 500-AFN 1000</li> <li>3. AFN 1000-AFN 1500</li> </ol>

	were connected to the electric grid and able to use electricity more frequently?	4. AFN 1500 -AFN 2000 5. AFN 2000-AFN 2500 6. AFN 2500-AFN 3000 7. AFN 3000-AFN 3500 8. AFN 3500-AFN 4000 9. AFN 4000-AFN 4500 10. AFN 4500 - AFN 5000 11. More than AFN 5000 888. I don't know 999. Refuse to answer
12	<p>If offered a new Solar Home System (three lights, TV and fan) for rent (including all maintenance) would you be willing to pay AFN \${rand3} per month for this source?</p> <p>The screen will show a random number between 0 and the maximum price in order to allow the research team to estimate a demand curve for the uptake of a given service.</p>	<p>_____</p> 888. I don't know 999. Refuse to answer
13	<p>If offered to buy a new Solar Home System (three lights, TV and fan) financed in 24 monthly installments, would you be willing/able to pay \$ per month for it over two years?</p> <p>the screen will show a random number between 0 and the maximum price in order to allow the research team to estimate a demand curve for the uptake of a given service.</p>	<p>_____</p> 888. I don't know 999. Refuse to answer
14	<p>If offered to buy a new Solar Lantern with mobile phone charging and 2 years warranty, would you be willing/able to pay AFS for this lighting source? the screen will show a random number between 0 and the maximum price in order to allow the research team to estimate a demand curve for the uptake of a given service.</p>	<p>_____</p> 888. I don't know 999. Refuse to answer

15	In general, would you like your electricity to be better, even if it cost more money?	1. Yes 2. Yes, but not if it cost money 3. No 888. I don't know 999. Refuse to answer
16	If your power were better, what would you want to use it to do?	1. Business (i.e. to work at home) 2. Education (i.e. to help household members study / do homework) 3. Health (i.e. to reduce impacts of smoke, cold, etc.) 4. Entertainment (i.e. to watch TV or listen to radio) 5. Communication (i.e. to charge phones, use internet) 6. Home activities (boiler/hot water, cooking, heating, cooling) 777. Other (specify) 888. I don't know 999. Refuse to answer
<b>LIGHTING</b>		
1	What is the main lighting source in this household?	1. Electricity 2. Biogas 3. Fuel-based lamp 4. Candles 5. Dry-cell torches/lamps/lights 6. LPG 7. None of the above 777. Other (specify)
2	In the last 12 months, for lighting, did you use any of the following as back-up solutions? <b>Multiple answers</b>	1. Candles 2. Open wick lamp 3. Hurricane lamp with glass cover 4. Pressurized mantle lamp 5. Dry-cell torches/lamps/lights 6. LPG 7. Biogas 8. None of the above 777. Other (specify)
3	In the last 12 months, did you use dry cell batteries to power any lamps? <b>Multiple answers</b>	1. Lanterns 2. Flashlights 3. No 777. Other (specify)

4	How much do you spend each month on dry cell batteries for lighting? <b>In AFN</b>	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
5	How much do you spend on lighting fuels for CANDLES in a typical week? <b>In AFN</b>	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
6	How much do you spend on lighting fuels for LPG in a typical week? <b>In AFN</b>	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
7	How much do you spend on lighting fuels for LPG in a typical week? <b>In AFN</b>	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
8	What are the most serious problems you experience with your lighting solutions? <b>Record up to two responses</b>	<p>1. Lamp too expensive</p> <p>2. Fuel too expensive</p> <p>3. Fuel not available</p> <p>4. Accidents can happen</p> <p>5. Bad for health</p> <p>6. No problems</p> <p>777. Other <b>(specify)</b></p>
9	In the last 12 months, were household members harmed by fuel-based lamps / candles in your house?	<p>1. Death or permanent limb damage</p> <p>2. Burns/fire</p> <p>3. Poisoning</p> <p>4. Eye problems</p> <p>5. Respiratory problems (cough)</p> <p>6. Minor injury</p> <p>7. Fire with no injury</p> <p>8. No, no one has been harmed</p> <p>777. Other <b>(specify)</b></p> <p>888. I don't know</p> <p>999. Refuse to answer</p>



<b>COOKING AND HEATING</b>		
1	Please tell us the age and gender of all persons who regularly cook food here.	
2	Age of person who regularly cooks	_____ 888. I don't know 999. Refuse to answer
3	Gender of person who regularly cooks	1. Female 2. Male
4	What type of stove does your household use most of the time / as a primary stove?	1. Stone / fire stove 2. Other self-built stove 3. Manufactured electric stove 4. Manufactured kerosene stove 5. Manufactured gas stove 6. Manufactured biomass stove 777. Other (specify)  888. I don't know 999. Refuse to answer
5	What is the manufacturer and model of the main stove? please have a look at the stove to verify, if possible	
6	In the last 12 months, what was the main fuel you used to power this cookstove? Please note both primary and secondary fuel.	1. Kerosene 2. Coal / lignite 3. Charcoal 4. Wood 5. Solar 6. Animal waste / dung 7. Crop residue / plant biomass 8. Saw dust 9. Coal briquette 10. Biomass briquette 11. Processed biomass (pellets) / woodchips 12. Ethanol 13. Biogas 14. LPG / cooking gas 15. Piped natural gas 16. Electric

		17. Garbage / plastic 777. Other (specify) 888. I don't know 999. Refuse to answer
7	In the last 12 months, where did most of the cooking take place?	1. In dwelling, NOT in sleeping area (Kitchen) 2. In dwelling, in a sleeping area 3. In a separate dwelling 4. In a veranda (roofed platform with at least two open sides) 777. Other (specify) 888. I don't know 999. Refuse to answer
8	Do you usually use a chimney, hood or other exhaust system while cooking?	1. Yes 2. No 888. I don't know 999. Refuse to answer
9	In the last 12 months, how often was fuel for your primary stove available?	1. Always available 2. Mostly available 3. Sometimes available 4. Rarely available 888. I don't know 999. Refuse to answer
10	Do you also use your primary stove for space heating?	1. Yes 2. No 888. I don't know 999. Refuse to answer
11	What is the main source for heating this household in the winter?	1. No heating 2. Bukhari 3. Sandali 4. Electric heater(s) 5. Gas heater(s) 6. Tandour oven 7. Tabakhana 777. Other (specify) 888. I don't know

		999. Refuse to answer
12	What are the fuels used for heating this household in the winter?	<ol style="list-style-type: none"> <li>1. Wood</li> <li>2. Wood chips</li> <li>3. Gas</li> <li>4. Electricity</li> <li>5. Crop residue</li> <li>6. Coal/charcoal</li> <li>7. Animal dung</li> <li>8. Mountain thorns/twigs/branches</li> <li>9. Bushes/straw/nut shells</li> <li>10. Rubbish, trash</li> <li>11. Rubber (shoes, tires...)</li> </ol> <p>888. I don't know</p> <p>999. Refuse to answer</p>
13	How much money did you spend on fuel for heating in the last month? <b>Answer in Afghani</b>	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
14	How much money do you usually spend on fuel for heating over one year? <b>Answer in Afghani</b>	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
15	In a typical week, how many total minutes do people in this household spend gathering, collecting or purchasing fuels (including travel time) for the household?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
16	<p>Please tell us the age, and gender, of all persons who regularly collect fuel for this household? <b>Please list all individuals who collect fuel</b></p> <p>Age of person who regularly collects fuel for this household</p>	

17	Gender of person who regularly collects fuel for this household	1. Female 2. Male
18		
19	What is the frequency of collection of fuel?	1. Daily 2. Bi-weekly 3. Weekly 4. Monthly 888. I don't know  999. Refuse to answer
20	In the last 12 months, did anyone in your household suffer any of these types of harm from cooking or from heating?	1. Death or permanent damage 2. Burns/fire/poisoning 3. Severe cough/respiratory problems 4. Other major injury 5. Minor injury 6. Fire with no injury 7. Itchy/water eyes 8. Light cough 9. None 888. I don't know  999. Refuse to answer
<b>ASSETS AND COMMUNICATION</b>		
1	How many of the following assets do you have? If none, write 0.	Refrigerator  Stove / gas balloon  Sewing machine  Iron  Radio / tape recorder  TV  VCR / DVD  Computer  Satellite phones  Electric fan  Bicycle  Motorcycle  Car

		<p>Carpets (khalin) - expensive quality, hand-woven</p> <p>Tractor / thresher</p> <p>Gilim, satrangi, namad, fash - other carpet products</p> <p>Blankets</p> <p>Mobile phones</p>
2	Are there any other important assets we should list here?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
3	Are members of your household able to charge at least one mobile phone as needed inside your dwelling?	<p>1. Yes</p> <p>2. No</p> <p>3. No, we do not have mobile phones</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
4	Are members of your household able to charge all their mobile phones as often as they need inside your dwelling?	<p>1. Yes</p> <p>2. No</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
5	Do members of your household have to go more than 500 meters (walk more than 5 minutes) to charge your mobile phones outside your dwelling?	<p>1. Yes</p> <p>2. No</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
6	Do you use a solar device to charge mobile phones?	<p>1. Yes</p> <p>2. No</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
7	If answered yes, how often do you use your solar device to charge mobile phones?	<p>1. Daily</p> <p>2. Weekly</p> <p>3. Occasionally</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>

8	<p>If you have to pay to do so, how much do you spend on average to charge your household mobile phones every week?</p> <p>In AFN</p>	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
PHOTOS		
1	Please take a photo of the generator.	
2	Please take a photo of the household's main stove	
3	Please take a photo of the electricity meter.	
4	Please take a photo of the main solar device.	
5	Please take a photo of the dwelling	
6	Please take a photo of the dwelling and surrounding dwellings / environment.	



## TOOL 2. Baseline Survey for Enterprises

Hello. My name is \_\_\_\_\_. I work for Samuel Hall, a research organization. We are calling to ask you a few questions about your experience with electricity and energy sources at your enterprise or institution. This research is being conducted by Samuel Hall for the World Bank, an organization that supports sustainable solutions for fighting poverty. The information collected today will be used solely for this research.

This questionnaire will stay confidential and your name (and that of your family members) will not be mentioned in this study. Your participation is entirely voluntary – you can say no or stop the conversation at any time.

	Question	Answer
<b>I. GENERAL</b>		
1.	Enumerator ID	_____
2.	Enumerator Name	_____
3.	Field Coordinator ID	
4.	Field Coordinator Name	
<b>II. BUSINESS/INSTITUTION IDENTIFICATION</b>		
1.	Province	1. Daikundi 2. Herat 3. Kabul 4. Paktia 5. Samangan
2.	Location Daikundi	1. Charkh 2. Ghaf 3. Khuga Chast 4. Sang-e-Mom 5. Sar-e-Nili 6. Qarya Dasht
3.	Location Herat	1. Jebraeel 2. Majghandak 3. Malikiha 4. Naw Abad Shuhadaye 5. Shaalbafaan 6. Qala-e-Sharbat

4.	Location Kabul	1. Dasht-e-Barchi 2. Deh Yahya 3. Karte Naw 4. Khair Khana 5. Langar 6. Shewaki
5.	Location Paktia	1. Baala Deh 2. Bano Zai 3. Habib Kala 4. Mondakhail 5. Nargese 6. Patan Kalai
6.	Location Samangan	1. Chawghai 2. Dawlatabad 3. Lab-e-Aab 4. Mula Qurban 5. Talkhaki 6. Yakatoot
<b>III. RESPONDENT INFORMATION</b>		
1.	First name	_____
2.	Last name	_____
3.	Gender of main respondent	1. Male 2. Female
4.	Age of main respondent	
5.	Position of main respondent	1. Owner 2. Manager 3. Assistant Manager 4. Administration and/or Finance 5. Employee 6. Apprentice 7. Wakil 8. Head Teacher 9. Teacher 10. Doctor 11. Nurse 777. Other: _____
6.	Ethnicity of main respondent	1. Pashtun 2. Uzbek 3. Tajik 4. Hazara 5. Turkmen 777. Other: _____

7.	Is the main respondent literate?	1 Yes 2 No 888. I don't know 999. Refuse to answer
8.	Language of interview?	1. Dari 2. Pashto
9.	Main respondent's phone number? <a href="#">Click to confirm the number works</a>	_____
10.	Full name of alternative / secondary respondent	_____
11.	Position of Alternative Respondent	1. Owner 2. Manager 3. Assistant Manager 4. Administration and/or Finance 5. Employee 6. Apprentice 7. Wakil 8. Head Teacher 9. Teacher 10. Doctor 11. Nurse 777. Other: _____
12.	Alternative / secondary respondent's phone number	_____
13	Is your business officially registered?	1. Yes, with the Municipality 2. Yes, with the ACBR (Chamber of Commerce) 3. Yes, with someone else (specify) 4. No 888. I don't know 999. Refuse to answer
14	Business Registration ID Number	_____
15	GPS Coordinates of the Household Dwelling	_____

16	Description of the business/institution location / address	_____
<b>IV. – BUSINESS/INSTITUTION INFORMATION</b>		
1.	What kind of business / institution is this?	1. Mosque 2. Clinic 3. School Factory (specify) 5. Administrative/office (specify) 6. Shop (specify) 1. Other (specify)
6.	What is the sector of your business / institution?	1. Agriculture/livestock 2. Road construction 3. Construction 4. Manufacturing 5. Hospitality/restaurants 6. Mechanic services 7. Transportation 8. Trade and distribution 9. Carpentry 10. Metalwork 11. Sewing, embroidery, tailoring 12. Carpet weaving 13. Electricity/plumbing 14. Administration/services 15. Retail 16. Education 17. Religious 777. Other (specify)
7.	How many men work here?	_____ 888. I don't know 999. Refuse to answer
8.	How many women work here?	_____ 888. I don't know 999. Refuse to answer
9.	How many people come here on an average day as patrons, clients, or customers?	_____ 888. I don't know 999. Refuse to answer

10.	Does this business/institute operate all year round?	1. Yes 2. No (SKIP TO Q11)
11.	If no: During which seasons does it operate?	1. Spring 2. Summer 3. Autumn 4. Winter
12.	What is the average monthly revenue of this business? <b>ANSWER IN AFGHANIS</b>	_____ 888. I don't know 999. Refuse to answer
13.	In a regular month, how many hours does this business / institution operate each day?	_____ 888. I don't know 999. Refuse to answer
14.	In a typical month, how many hours does this business / institution operate each night?	_____ 888. I don't know 999. Refuse to answer
15.	Please specify the typical working hours.	_____ 888. I don't know 999. Refuse to answer
16.	Time - Opening Hour	_____ 888. I don't know 999. Refuse to answer
17.	Time - Closing Hour	_____ 888. I don't know 999. Refuse to answer
18.	Compared to this year, how do you see the future of your business/institution 2 years from now?	1. A lot better 2. A little better 3. The same 4. A little worse

		5. A lot worse 888. I don't know
<b>V. – BUILDING</b>		
1.	How long has this business/institution occupied this space?	_____ 888. I don't know 999. Refuse to answer
2.	How large is the space?	_____ 888. I don't know 999. Refuse to answer
3.	How large is the space this business / institution occupies?	_____ 888. I don't know 999. Refuse to answer
4.	Length in meters	_____ 888. I don't know 999. Refuse to answer
5	Width in meters	_____ 888. I don't know 999. Refuse to answer
6	How many rooms does this business / institution occupy?	_____ 888. I don't know 999. Refuse to answer
7	How many rooms does this business / institution occupy?	_____ 888. I don't know 999. Refuse to answer

8	What is this type of building? <b>DO NOT PROMPT. Single answer. Please check with observation.</b>	1. A single house/building occupied by just this business / institution 2. A single house/building occupied by just this business / institution 3. A single house/building occupied by just this business / institution 4. A single house/building occupied by just this business / institution 5. Shop located on street off the main road 6. Shop located on street off the main road 777. Other <b>(specify)</b>
9	Approximately how many years ago was this building constructed? <b>Give answer in years. 888 for "I don't know", 999 for "Refuse to answer"</b>	_____ 888. I don't know 999. Refuse to answer
10	Does the owner of the business own this building / space or is it leased by this business	1. The owner occupies this building 2. The building is leased 3. The building is rented 4. The building is both leased and rented
11	Is this building owned by a government agency?	1. Yes 2. No 888. I don't know 999. Refuse to answer
12	Is it owned by the central government or the local government?	1. Central government 2. Local Government
13	How much do you pay monthly to rent/lease this space? <b>Please give answer in Afghanis. 888 for "I don't know", 999 for "refuse to answer"</b>	_____ 888. I don't know 999. Refuse to answer
14	The walls of this building are mainly made of what material?  <b>Select up to 2, but if it is mainly just one material, please select just one</b>	1. Fired brick / stone 2. Concrete / cement 3. Mud bricks / mud 4. Stone / mud 777. Other <b>(specify)</b>



15	The roof of the dwelling is mainly made of what material? <b>DO NOT PROMPT.</b> Single answer. Please check with observation.	1. Concrete (with metal) 2. Wood / wood with mud 3. Tin / metal 4. Girder with fired brick 777. Other (specify)
16	The floor of the dwelling is mainly made of what material? <b>DO NOT PROMPT.</b> Single answer. Please check with observation.	1. Mud / earth 2. Concrete / tile 777. Other (specify)
<b>VI. – ENERGY USES</b>		
1.	How important is electricity to your workplace?	1. Not that important (I only need lights) 2. A little important 3. Very important 4. Extremely important (I cannot do anything without it)
2	What tools / equipment / machinery / appliances use energy (includes gas, human/animal power) <b>Multiple answers</b>	1. Electronic devices (phones, computers... ) 2. Equipment with a motor (pumps, drill machines, sewing machine...) 3. Space heating (local or central) 4. Product and water heating (cooking, ironing, welding...) 5. Space cooling (fans, airconditioners...) 6. Product cooling (refridgerators and freezers) 7. Lighting
3	How many of the following electronic devices does your business / institution use? <b>Multiple answers</b>	1. Cell phone charger 2. DVD player 3. Fax machine 4. Internet router 5. Personal computer/laptop 6. Photocopier 7. Printer 8. Transistor radio 9. Two-way radio (walkie talkie) 10. Satellite dish 11. TV 12. Other (specify)
<b>VI. a. MOTIVE POWER DEVICES</b>		
1	How many of the following motive power devices does your business / institution use? <b>Multiple answers</b>	1. Drill 2. Excavator 3. Grain mill 4. Lathe 5. Milling machine 6. Pottery equipment 7. Saw 8. Sewing machine

		9. Spinning wheel/loom 10. Washing machine 11. Water pump 12. Other motive devices (specify)
<b>VI. b. COOLING APPLIANCES</b>		
1	How many of the following cooling appliances does your business / institution use? Multiple answers	1. Air conditioner 2. Fan 3. Refrigerator/freezer 4. Other (specify)
<b>VI. c. PRODUCT-HEATING DEVICES</b>		
1	How many of the following product-heating appliances does your business / institution use? Multiple answers	1. Cooker 2. Electric burner 3. Forge 4. Grain dryer 5. Iron 6. Kettle 7. Welding machine 8. Microwave 9. Oven 10. Pottery kiln 11. Toaster 12. Water heater 13. Other (specify)
<b>VI. d. THREE MOST IMPORTANT DEVICES</b>		
1	What are the three most important tools / equipment / appliances for your business?	Device 1 Text: Device 2 Text: Device 3 Text:
<b>VI. f. POWER OF DEVICES</b>		
1	How are these three equipment/tools/appliances powered?	Device 1 Select one 1. Electricity 2. Liquid fuels 3. Manually 4. Gas 5. No power necessary 777. Other (specify)  Device 2 Select one 1. Electricity 2. Liquid fuels 3. Manually 4. Gas 5. No power necessary

		<p>777. Other (specify)</p> <p>Device 3 Select one</p> <ol style="list-style-type: none"> <li>Electricity</li> <li>Liquid fuels</li> <li>Manually</li> <li>Gas</li> <li>No power necessary</li> </ol> <p>777. Other (specify)</p>
<b>VI. g. LIGHTING SOURCE</b>		
<b>1</b>	What is the main source of energy used for lighting this business/institution?	<ol style="list-style-type: none"> <li>No lighting in the business/institution</li> <li>Electricity</li> <li>Gas</li> <li>Candel</li> <li>Fuel (oil, kerosene, etc)</li> </ol> <p>777. Other</p>
<b>2</b>	Cooling	<ol style="list-style-type: none"> <li>Yes</li> <li>No</li> </ol>
<b>3</b>	Which type of equipment/tools/machinery/appliances ?	Text
<b>4</b>	What prevents you from using more powered tools/equipment/machinery/appliances ?	<ol style="list-style-type: none"> <li>Nothing</li> <li>The cost of electricity/fuels</li> <li>Reliability of electricity supply</li> <li>Lack of energy supply</li> <li>Energy supply is not powerful enough</li> <li>The cost of the equipment and tools</li> <li>The difficulty of use of powered equipment and tools</li> </ol> <p>777. Other (specify)</p>
<b>5</b>	Has your workplace suffered from lack of electricity?	<ol style="list-style-type: none"> <li>Yes</li> <li>No</li> </ol>
<b>6</b>	If electricity supply was increased to this area, what would happen to your business / institution	<ol style="list-style-type: none"> <li>It would hurt my business (other businesses would do better)</li> <li>It would stay about the same</li> <li>It would grow a little</li> <li>It would grow a lot</li> </ol>

7	According to you, if electricity was made cheaper, your sector as a whole would:	1. Grow a lot 2. Grow a little 3. Stay about the same 4. Decrease a little 5. Decrease a lot 6. I don't know 7. Refuse to answer
8	If your electricity supply was better, what would you want to use it to do? <b>Multiple answers</b>	1. Upgrade business appliances, equipment and tools 2. Open longer hours 3. Produce more goods/services 4. Employ more people 5. Nothing (it wouldn't change my business / institute) 777. Other <b>(specify)</b>  888. I don't know  999. Refuse to answer
<b>V. NATIONAL GRID</b>		
1	Is this business / institution currently connected to the national electricity grid?	1. Yes 2. No <b>SKIP to Q33</b>
2	In the last 12 months, was grid electricity the PRIMARY energy source for this business / institution?	1. Yes 2. No
3	How many years have you had this grid connection at this location?	_____  888. I don't know  999. Refuse to answer
4	How much did your business / institute pay for the grid connection fee?	_____  888. I don't know  999. Refuse to answer
5	How many days did it take to obtain an electrical connection after you first applied?	_____  888. I don't know  999. Refuse to answer

6	Who did you pay for the grid connection?	<ol style="list-style-type: none"> <li>1. Electricity company / utility</li> <li>2. Electrician</li> <li>3. Landlord</li> <li>4. Neighbour</li> <li>5. Community / village / municipality</li> <li>6. No one / we did not pay for the grid connection (someone else paid, it was free)</li> <li>777. Other (specify)</li> <li>888. I don't know</li> <li>999. Refuse to answer</li> </ol>
7	Does your household have an operational electricity meter?	<ol style="list-style-type: none"> <li>1. Yes, we have an operational meter</li> <li>2. Yes, we have a meter but it is not operational</li> <li>3. No, we do not have a meter</li> <li>888. I don't know</li> <li>999. Refuse to answer</li> </ol>
8	Is your electricity meter shared by any other businesses / institutions or dwellings?	<ol style="list-style-type: none"> <li>1. No</li> <li>2. Yes, we share our meter with other businesses / institutions</li> <li>3. Yes, we share our meter with other households</li> <li>888. I don't know</li> <li>999. Refuse to answer</li> </ol>
9	How many other entities do you share your meter with?	
10	Who do you pay for your electricity service?	<ol style="list-style-type: none"> <li>1. Energy company (e.g. Breshna)</li> <li>2. Community / village / municipality</li> <li>3. Relative</li> <li>4. Neighbour</li> <li>5. Landlord</li> <li>6. Someone who does not belong to the utility</li> <li>7. No one / we did not pay for the grid connection (someone else paid, it was free)</li> <li>777. Other (specify)</li> <li>888. I don't know</li> <li>999. Refuse to answer</li> </ol>

11	Do you receive a different rate for your electricity from your provider because you are a business / institution?	1. Yes 2. No
12	How are you billed for electricity?	1. Fixed regular fee 2. Charged based on lights and appliances used 3. Charged based on utility estimated consumption 4. Charged based on kWh 5. Pay for spare parts/maintenance 777. Other (specify) 888. I don't know 999. Refuse to answer
13	How often does your electricity bill come / what period does it cover?	1. Every two months 2. Every month 3. Weekly 4. I can pay as often as I want 777. Other (specify) 888. I don't know 999. Refuse to answer
14	How do you make your electricity bill payment?	1. Cash 2. Vouchers from local store 3. Credits using mobile money 4. Pay at utility office 5. Pay at the bank 6. Pay at the post office 777. Other (specify) 888. I don't know 999. Refuse to answer
15	How much were you charged for the most recent billing period of electricity on your bill? Give answer in Afghanis	_____ 888. I don't know 999. Refuse to answer
16	In the last billing period how much energy did your business / institution use? Give answer in kWh	_____ 888. I don't know 999. Refuse to answer

17	Is the performance of electricity supply the same all year? [i.e. do you always have the service?]	1. Yes 2. No
18	What are the worst months for service from the grid to your household?	1. January 2. February 3. March 4. April 5. May 6. June 7. July 8. August 9. September 10. October 11. November 12. December 13. Every month 888. I don't know  999. Refuse to answer
19	Hours of electricity from grid (daily)	
20	How many hours of electricity are AVAILABLE each day and night from the grid (over maximum 24 hours) in a typical month for electricity?	_____  888. I don't know  999. Refuse to answer
22	How many hours of electricity are AVAILABLE each evening between 6pm and 10pm from the grid in a typical month for electricity?	_____  888. I don't know  999. Refuse to answer
23	How many hours of electricity do you USE in total over one full day (24 hour period) from the grid in a typical month?	_____  888. I don't know  999. Refuse to answer
24	On average, how many electricity outages occur in one week during a typical month?	_____  888. I don't know



		999. Refuse to answer
25	On average, how many electricity unannounced/unexpected outages occur in one week?	_____ 888. I don't know 999. Refuse to answer
27	If you add up all the time, approximately how many hours do you not have electricity due to outages in an average DAY? (Hours)	_____ 888. I don't know 999. Refuse to answer
28	Are your working hours limited by the duration of electricity supply?	1. Yes 2. No
29	What is your main back-up source of LIGHTING during outages / blackouts from the grid? <b>Select multiple</b>	1. Generator 2. Battery and storage devices (e.g. car battery) 3. Solar home system 4. Solar lantern / lighting system 5. No backup source 777. Other <b>(specify)</b> 888. I don't know 999. Refuse to answer
30	What are the most serious problems you experience with your grid electricity?	1. Too expensive 2. Cannot power large appliances 3. Supply shortage/not enough hours of electricity 4. Low / high voltage problems or voltage fluctuations 5. Breaks too often 6. Unexpectedly high bills 7. Maintenance and availability of spare parts 8. It is dangerous/people can get hurt 9. Poor quality of light 10. Battery problems 11. No problems 777. Other <b>(specify)</b> 888. I don't know 999. Refuse to answer

31	In the last 12 months, did any of your appliances get damaged because the voltage was going?	1. Yes 2. No
32	In the last 12 months, did any household members die or have permanent limb (bodily injury)	1. Yes 2. No
33	What is the main reason why your household is not connected to the grid?	1. Grid is too far from household / not available 2. Cost of initial connection is too expensive 3. Regular costs are too expensive 4. Satisfied with current energy solution 5. Renting - landlord decision 6. Service unreliable 7. Administrative procedure is too complicated 8. Submitted application and waiting for connection 9. Company refused to connect the household 777. Other (specify)
34	Do you expect to get a grid connection in the future?	1. Yes 2. No
35	When do you expect to get a grid connection? (Years)	_____ 888. I don't know 999. Refuse to answer
<b>VI. MINI GRID</b>		
1	Is this business / institution currently connected to the mini-grid?	1. Yes 2. No
2	Can you tell me how this mini-grid is powered?	5. Solar power 6. Wind power 7. Hydro power 8. Diesel/petrol engine power 777. Other (specify) 888. I don't know 999. Refuse to answer

3	In the last 12 months, was your mini-grid connection the PRIMARY energy source for your business / institution?	1. Yes 2. No
4	Is there a limit for the load and/or appliances you are allowed to power from this mini-grid?	1. Yes 2. No
5	What is the limit for the load and/or appliances you are allowed to power from this mini-grid? <b>Note unit of measurement</b>	888. I don't know 999. Refuse to answer
6	What is the name of the local mini-grid company or provider?	888. I don't know 999. Refuse to answer
7	How many years have you had this mini-grid connection? <b>If less than 1 year, press 0</b>	_____ 888. I don't know 999. Refuse to answer
8	How much did your household pay for the mini-grid connection fee?	_____ 888. I don't know 999. Refuse to answer
9	Who do you currently pay for your electricity service?	1. Electricity company / utility 2. Electrician 3. Landlord 4. Neighbour 5. Community / village / municipality 6. No one / we did not pay for the grid connection (someone else paid, it was free) 777. Other <b>(specify)</b>  888. I don't know 999. Refuse to answer

10	Does your business/institution have an operational electricity meter?	<ol style="list-style-type: none"> <li>1. Yes, we have an operational meter</li> <li>2. Yes, we have a meter but it is not operational</li> <li>3. No, we do not have a meter</li> </ol> <p>888. I don't know</p> <p>999. Refuse to answer</p>
11	Is your electricity meter shared by any other businesses, institutions or households?	<ol style="list-style-type: none"> <li>1. No</li> <li>2. Yes, we share our meter with other businesses / institutions</li> <li>3. Yes, we share our meter with other households</li> </ol> <p>888. I don't know</p> <p>999. Refuse to answer</p>
12	How many other businesses/institutions/households do you share it with?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
13	How are you billed for electricity? Please ask to see the last bill	<ol style="list-style-type: none"> <li>1. Fixed regular fee</li> <li>2. Charged based on lights and appliances used</li> <li>3. Charged based on utility estimated consumption</li> <li>4. Charged based on kWh</li> <li>5. Pay for spare parts/maintenance</li> </ol> <p>777. Other (specify)</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
14	How do you make your electricity bill payment?	<ol style="list-style-type: none"> <li>1. Cash</li> <li>2. Vouchers from local store</li> <li>3. Credits using mobile money</li> <li>4. Pay at utility office</li> <li>5. Pay at the bank</li> <li>6. Pay at the post office</li> </ol> <p>777. Other (specify)</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
15	How often does your electricity bill come / what period does it cover?	<ol style="list-style-type: none"> <li>1. Every two months</li> <li>2. Every month</li> <li>3. Weekly</li> <li>4. I can pay as often as I want</li> </ol> <p>777. Other (specify)</p>

		888. I don't know 999. Refuse to answer
16	How much were you charged for the most recent billing period of electricity on your bill? <b>Give answer in Afghanis</b>	_____ 888. I don't know 999. Refuse to answer
17	In the last billing period how much energy did your business / institution use? <b>Give answer in kWh</b>	_____ 888. I don't know 999. Refuse to answer
18	Is the performance of electricity supply the same all year? [i.e. do you always have the service?]	1. Yes 2. No
19	What are the worst months for service from the grid to your household? <b>Select one or two</b>	1. January 2. February 3. March 4. April 5. May 6. June 7. July 8. August 9. September 10. October 11. November 12. December 13. Every month 888. I don't know 999. Refuse to answer
20	Hours of electricity from mini-grid (daily)	_____ 888. I don't know 999. Refuse to answer
21	How many hours of electricity are AVAILABLE each day and night from the	_____ 888. I don't know

	mini-grid (over maximum 24 hours) in a typical month for electricity?	999. Refuse to answer
22	How many hours of electricity are AVAILABLE each evening between 6pm and 10pm from the mini-grid in a typical month for electricity?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
23	How many hours of electricity do you USE in total over one full day (24 hour period) from the mini-grid in a typical month?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
24	On average, how many electricity outages occur in one week during a typical month?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
25	On average, how many electricity unannounced/unexpected outages occur in one week?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
26	If you add up all the time, approximately how many hours do you not have electricity due to outages in an average DAY? (Hours)	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
27	Are your working hours limited by the duration of electricity supply?	<p>1. Yes</p> <p>2. No</p>
28	What is your main back-up source of LIGHTING during outages / blackouts from the mini grid? <b>Select multiple</b>	<p>1. Generator</p> <p>2. Battery and storage devices (e.g. car battery)</p> <p>3. Solar home system</p> <p>4. Solar lantern / lighting system</p> <p>5. No backup source</p> <p>777. Other (specify)</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>

29	What are the most serious problems you experience with your mini grid electricity? <b>Select up to two choices</b>	1. Too expensive 2. Cannot power large appliances 3. Supply shortage/not enough hours of electricity 4. Low / high voltage problems or voltage fluctuations 5. Breaks too often 6. Unexpectedly high bills 7. Maintenance and availability of spare parts 8. It is dangerous/people can get hurt 9. Poor quality of light 10. Battery problems 11. No problems 777. Other <b>(specify)</b>  888. I don't know  999. Refuse to answer
30	In the last 12 months, did any of your appliances get damaged because the voltage was going?	3. Yes 4. No
31	In the last 12 months, did any household members die or have permanent limb (bodily injury)	3. Yes 4. No
<b>VII. ELECTRIC GENERATOR</b>		
1	In the last 12 months, did this business/institution use a generator to supply electricity	3. Yes 4. No
2	In the last 12 months, was generator power the PRIMARY energy source for this business/ins	3. Yes 4. No
3	How many generators does your business/institution use to supply electricity?	_____ 888. I don't know  999. Refuse to answer
4	Is your generator shared by any other businesses, institutions or households?	_____

		<p>888. I don't know</p> <p>999. Refuse to answer</p>
5	How many businesses, institutions or households share this generator (including yours)?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
6	What is the capacity of the generator? In <b>kW preferable</b>	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
7	In the last 12 months, in which months did you use the generator?	<ol style="list-style-type: none"> <li>1. January</li> <li>2. February</li> <li>3. March</li> <li>4. April</li> <li>5. May</li> <li>6. June</li> <li>7. July</li> <li>8. August</li> <li>9. September</li> <li>10. October</li> <li>11. November</li> <li>12. December</li> <li>13. Every month</li> </ol> <p>888. I don't know</p> <p>999. Refuse to answer</p>
8	In the last 12 months, what did your business / institution use this generator for?	<ol style="list-style-type: none"> <li>1. Electronic devices (phones, computers... )</li> <li>2. Equipment with a motor (pumps, drill machines, sewing machine...)</li> <li>3. Space heating (local or central)</li> <li>4. Product and water heating (cooking, ironing, welding...)</li> <li>5. Space cooling (fans, airconditioners...)</li> <li>6. Product cooling (refridgerators and freezers)</li> <li>7. Lighting</li> <li>777. Other <b>(specify)</b></li> </ol>
9	How many days per week did you typically use the generator?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>



10	How many years have you used this generator for?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
11	Does this business/institution own the generator?	<p>1. Yes</p> <p>2. No</p>
12	Who owns the generator?	<p>1. Other business, institution or household</p> <p>2. Community organisation</p> <p>3. Private person / entity (including landlord, rental company, etc.)</p> <p>777. Other (specify)</p>
13	Do you rent the generator or use it for free?	<p>1. Rent</p> <p>2. Use for free</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
14	How do you pay for electricity services from the generator?	<p>1. Cash</p> <p>2. Vouchers from local store</p> <p>3. Credits using mobile money</p> <p>4. Pay at utility office</p> <p>5. Pay at the bank</p> <p>6. Pay at the post office</p> <p>777. Other (specify)</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
15	In the months that you used it, how much do you typically pay to use the generator each month	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
16	How much did you pay to purchase the generator?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>

17	In the last 12 months, how much did you pay for repairs/parts/maintenance of the generator?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
18	What fuel is used to power the generator?	<p>1. Diesel</p> <p>2. Gasoline/petrol</p> <p>777. Other (specify)</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
19	In the last 30 days, what was the total quantity of fuel used to power the generator? Amount in litre	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
20	Do you pay for the fuel used to power the generator?	<p>1. Yes</p> <p>2. No</p>
21	What is the price per litre for fuel currently? Amount in Afghanis	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
22	In the last 30 days, how much did your business / institution spend on fuel for this generator? Amount in Afghanis	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
23	Are there certain months / seasons every year when less fuel is available to power the generator?	<p>1. Yes</p> <p>2. No</p>
24	What are the worst months of fuel availability for the generator? Select multiple (one or two answers).	<p>1. January</p> <p>2. February</p> <p>3. March</p> <p>4. April</p> <p>5. May</p> <p>6. June</p> <p>7. July</p>

		8. August 9. September 10. October 11. November 12. December 13. Every month 888. I don't know  999. Refuse to answer
25	How many hours do you use this generator each day (over maximum 24 hours) in a typical mon	 888. I don't know  999. Refuse to answer
26	How many hours do you actually use this generator each evening between 6pm to 10pm?	 888. I don't know  999. Refuse to answer
27	What would you say the share of electricity is you get from your generator out of your total? A percentage out of 100.	 888. I don't know  999. Refuse to answer
28	Are your working hours limited by the duration of electricity supply from your generator?	1. Yes 2. No
29	What are the most serious problems you experience with your generator?	1. Too expensive 2. Cannot power large appliances 3. Supply shortage/not enough hours of electricity 4. Low / high voltage problems or voltage fluctuations 5. Breaks too often 6. Unexpectedly high bills 7. Maintenance and availability of spare parts 8. It is dangerous/people can get hurt 9. Poor quality of light 10. Battery problems 11. No problems 777. Other (specify)  888. I don't know  999. Refuse to answer

30	In the last 12 months, did any of your appliances get damaged because the voltage was going?	1. Yes 2. No
31	In the last 12 months, did any household members die or have permanent limb (bodily injury)	1. Yes 2. No
RECHARGEABLE BATTERY		
1	In the last 12 months, did this business/institution use a rechargeable battery to supply electricity	3. Yes 4. No
2	In the last 12 months, was rechargeable battery power the PRIMARY energy source for this business/ins	3. Yes 4. No
3	How many batteries do you have?	_____ 888. I don't know 999. Refuse to answer
4	In the last 12 months, what did your business/institution use rechargeable batteries for? <b>Multiple answers</b>	1. Electronic devices (phones, computers... ) 2. Equipment with a motor (pumps, drill machines, sewing machine...) 3. Space heating (local or central) 4. Product and water heating (cooking, ironing, welding...) 5. Space cooling (fans, airconditioners...) 6. Product cooling (refridgerators and freezers) 7. Lighting 777. Other <b>(specify)</b> 888. I don't know 999. Refuse to answer
5	Does your business/institution have an inverter that allows you to use AC appliances?	3. Yes 4. No

6	<p>What is the capacity of the inverter?</p> <p>Please note capacity and unit of measurement given</p>	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
7	<p>Now we would like to get some information on each of your batteries. Enumerators, please ask to see batteries, and then ask the following questions about each of their batteries. You should repeat this group for each battery - for example, if they said they have two batteries, please repeat it twice. If the respondents are unsure of answers, please look at the batteries yourself to see if possible, or ask them to estimate.</p>	
8	<p>What is the capacity of this rechargeable battery? Please answer in ampere hours (Ah)</p>	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
9	<p>What is the capacity of this rechargeable battery? If 1 battery, please give the amount in volts (V)</p>	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
10	<p>What is the capacity of this rechargeable battery? If 2 battery, please give the amount in ampere hours (AH)</p>	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
11	<p>What is the capacity of this rechargeable battery? If 3 or more batteries, please give the amount in Ampere</p>	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>

12	What is the voltage of the rechargeable battery? Please give the amount in volts (V)	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
13	What was the cost to purchase the rechargeable battery? Amount in Afghanis	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
14	Do you pay to recharge these batteries?	<p>1. Yes</p> <p>2. No</p>
15	How much does your business/institution spend in a typical month to recharge the batteries? Amount in Afghanis	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
16	What is the electricity source used to recharge the battery? Select multiple	<p>1. National grid</p> <p>2. Local mini-grid</p> <p>3. Electric generator</p> <p>4. Solar</p> <p>777. Other (specify)</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
17	Is battery recharging limited by availability of electricity from this source?	<p>1. Yes</p> <p>2. No</p>
18	How many hours on average do you actually USE rechargeable batteries for electricity supply	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
19	How many hours on average do you use batteries for electricity supply each evening from 6pm to 10pm?	<p>_____</p> <p>888. I don't know</p>

		999. Refuse to answer
20	What are the most serious problems you experience with your generator?	1. Too expensive 2. Cannot power large appliances 3. Supply shortage/not enough hours of electricity 4. Low / high voltage problems or voltage fluctuations 5. Breaks too often 6. Unexpectedly high bills 7. Maintenance and availability of spare parts 8. It is dangerous/people can get hurt 9. Poor quality of light 10. Battery problems 11. No problems 777. Other (specify)  888. I don't know  999. Refuse to answer
21	In the last 12 months, did any of your appliances get damaged because the voltage was going?	1. Yes 2. No
22	In the last 12 months, did any household members die or have permanent limb (bodily injury)	1. Yes 2. No
<b>PICO-HYDRO</b>		
1	In the last 12 months, did this business/institution use a pico-hydro system for electricity?	1. Yes 2. No
2	In the last 12 months, was pico-hydro power the PRIMARY energy source for your business/institution?	1. Yes 2. No
3	Do you share this pico-hydro with other businesses, institutions or households?	1. Yes 2. No

4	How many businesses, institutions and/or households are sharing electricity from this pico-hydro?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
5	What is the capacity of the pico-hydro system? <b>Please answer in kilowatt hours (kWh)</b>	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
6	In the last 12 months, in which months did you use the pico-hydro system? <b>Select all that apply.</b>	<p>1. January</p> <p>2. February</p> <p>3. March</p> <p>4. April</p> <p>5. May</p> <p>6. June</p> <p>7. July</p> <p>8. August</p> <p>9. September</p> <p>10. October</p> <p>11. November</p> <p>12. December</p> <p>13. Every month</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
7	How many days per months did you typically use the pico-hydro? <b>Please enter number of days (maximum 31).</b>	
8	In the last 12 months, what did your household use this pico-hydro for?	<p>1. Electronic devices (phones, computers... )</p> <p>2. Equipment with a motor (pumps, drill machines, sewing machine...)</p> <p>3. Space heating (local or central)</p> <p>4. Product and water heating (cooking, ironing, welding...)</p> <p>5. Space cooling (fans, airconditioners...)</p> <p>6. Product cooling (refridgerators and freezers)</p> <p>7. Lighting</p> <p>777. Other <b>(specify)</b></p> <p>888. I don't know</p> <p>999. Refuse to answer</p>



9	How many years has your business / institution used this pico-hydro system?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
10	Does your business/institution own this pico-hydro system?	<p>1. Yes</p> <p>2. No</p>
11	Who owns the pico-hydro ?	<p>1. Other business, institution or household</p> <p>2. Community organisation</p> <p>3. Private person / entity (including landlord, rental company, etc.)</p> <p>777. Other (specify)</p>
12	Do you rent the pico-hydro or use it for free?	<p>1. Rent</p> <p>2. Use for free</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
13	How do you pay for electricity service from the pico-hydro system?	<p>1. Cash</p> <p>2. Vouchers from local store</p> <p>3. Credits using mobile money</p> <p>4. Pay at utility office</p> <p>5. Pay at the bank</p> <p>6. Pay at the post office</p> <p>777. Other (specify)</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
14	How much do you pay to use the pico-hydro system each month?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
15	How much did you pay to purchase or construct the pico-hydro system?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>

16	In the last 12 months, how much did you pay for repairs/parts/maintenance of the pico-hydro?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
17	<p>What are the worst months for electricity from the pico-hydro system?</p> <p>Select multiple (one or two answers).</p>	<p>1. January</p> <p>2. February</p> <p>3. March</p> <p>4. April</p> <p>5. May</p> <p>6. June</p> <p>7. July</p> <p>8. August</p> <p>9. September</p> <p>10. October</p> <p>11. November</p> <p>12. December</p> <p>13. Every month</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
18	In a typical month, how many hours do you use the pico-hydro system each day (24 hour period)? Answer cannot exceed 24 hours	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
19	In a typical month, how many hours of electricity are available each evening from the pico-hydro (6pm-10pm)?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
20	On average, how many electricity outages occur in one week?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
21	Are your working hours limited by the duration of the pico-hydro electricity supply?	<p>1. Yes</p> <p>2. No</p>

22	What are the most serious problems you experience with your pico-hydro ?	1. Too expensive 2. Cannot power large appliances 3. Supply shortage/not enough hours of electricity 4. Low / high voltage problems or voltage fluctuations 5. Breaks too often 6. Unexpectedly high bills 7. Maintenance and availability of spare parts 8. It is dangerous/people can get hurt 9. Poor quality of light 10. Battery problems 11. No problems 777. Other (specify) 888. I don't know 999. Refuse to answer
23	In the last 12 months, did any of your appliances get damaged because the voltage was going?	1. Yes 2. No
24	In the last 12 months, did any household members die or have permanent limb (bodily injury)	1. Yes 2. No
<b>SOLAR</b>		
1	In the last 12 months, did this business/institution use a Solar Home System and/or any So	3. Yes 4. No
2	In the last 12 months, did this business/institution use a Solar Home System and/or any So	1. Yes 2. No
3	Why isn't the solar system the primary source of electricity in the business/institution?	1. Connection is broken and not working 2. Supply Shortage/not enough hourse of electricity 3. Cannot power large appliances 4. Too expensive 5. Low / high voltage problems or fluctuations 6. Unpredictable interruptions 777. Other (specify) 888. I don't know 999. Refuse to answer

4	How many solar home systems (SHS) do you have? <b>Give description of SHS and show photo.</b>	_____ 888. I don't know 999. Refuse to answer
5	I like to know about the capacity of each of your solar home systems. <b>Enumerators, please repeat this section for each SHS the household has.</b>	
6	What is the capacity of this device? <b>Please give answer in kilowatts (kW)</b>	_____ 888. I don't know 999. Refuse to answer
7	How many solar lighting systems do you have? <b>Give description of SHS and show photo.</b>	_____ 888. I don't know 999. Refuse to answer
8	How many solar lanterns do you have? <b>Give description and show photo.</b>	_____ 888. I don't know 999. Refuse to answer
9	What is your main solar device?	1. Solar home system 2. Solar lighting system 3. Solar lantern 777. Other <b>(specify)</b>  888. I don't know 999. Refuse to answer
10	What is the manufacturer and/or model of your main solar device?	_____ 888. I don't know 999. Refuse to answer

11	How many light bulbs are there (that can be separated from each other)?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
12	What is the width of the solar panel? <b>Please give answer in centimetres (cm)</b>	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
13	What is the length of the solar panel? <b>Please give answer in centimetres (cm)</b>	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
14	What is the capacity of the battery? <b>Please give answer in kilowatts (kW)</b>	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
15	What is the capacity of the battery? <b>Please give answer in ampere hours (Ah)</b>	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
16	Do you have an inverter to be used in conjunction with the solar power device(s)?	<p>3. Yes</p> <p>4. No</p>
17	How many years have you had the main solar device?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
18	How did you get your main solar device?	<p>1. Bought</p> <p>2. Rent/pay fee to use</p> <p>3. Came with the house/apartment</p> <p>4. Received for free</p> <p>777. Other <b>(specify)</b></p> <p>888. I don't know</p>

		999. Refuse to answer
19	Did you receive information and training on the main solar device?	1. Yes 2. No
20	Compared to the first time you used solar lighting, do you currently: <b>Single answer</b>	1. Use more solar lighting 2. Use about the same amount of solar lighting 3. Use less solar lighting
21	In the last 12 months, in which months was service available from the main solar device?	1. January 2. February 3. March 4. April 5. May 6. June 7. July 8. August 9. September 10. October 11. November 12. December 13. Every month 888. I don't know  999. Refuse to answer
22	How many hours of service is available from the main solar device each day (over a 24 hour period)? <b>Answer cannot exceed 24 hours.</b>	_____ 888. I don't know  999. Refuse to answer
23	How many hours of service is available from the main solar device in the evening from 6pm-10pm? <b>Answer should be maximum 4 hours</b>	_____ 888. I don't know  999. Refuse to answer
24	How many hours do you actually USE the main solar device for lighting or other uses each day? <b>Answer cannot exceed 24 hours</b>	_____ 888. I don't know  999. Refuse to answer

25	In the last 12 months, what did your business/institution use solar power for? <b>Select multiple</b>	<ol style="list-style-type: none"> <li>Electronic devices (phones, computers... )</li> <li>Equipment with a motor (pumps, drill machines, sewing machine...)</li> <li>Space heating (local or central)</li> <li>Product and water heating (cooking, ironing, welding...)</li> <li>Space cooling (fans, airconditioners...)</li> <li>Product cooling (refridgerators and freezers)</li> <li>Lighting</li> <li>Other <b>(specify)</b></li> </ol> <p>888. I don't know</p> <p>999. Refuse to answer</p>
26	What are the most serious problems you experience with the main solar device? <b>Select up to 2</b>	<ol style="list-style-type: none"> <li>Too expensive</li> <li>Cannot power large appliances</li> <li>Supply shortage/not enough hours of electricity</li> <li>Low / high voltage problems or voltage fluctuations</li> <li>Breaks too often</li> <li>Unexpectedly high bills</li> <li>Maintenance and availability of spare parts</li> <li>It is dangerous/people can get hurt</li> <li>Poor quality of light</li> <li>Battery problems</li> <li>No problems</li> <li>Other <b>(specify)</b></li> </ol> <p>888. I don't know</p> <p>999. Refuse to answer</p>
27	In the last 12 months, did any of your appliances get damaged because the voltage was going?	<ol style="list-style-type: none"> <li>Yes</li> <li>No</li> </ol>
28	In the last 12 months, did any household members die or have permanent limb (bodily injury)	<ol style="list-style-type: none"> <li>Yes</li> <li>No</li> </ol>
<b>WILLINGNESS TO PAY</b>		
1	Would you be willing/able to pay $\{wtp\_thresh\_grid\_once\}$ for this business/institution to	<ol style="list-style-type: none"> <li>Yes</li> <li>No</li> </ol>

2	<p>Would you be willing / able to pay MAX AFS 5,200 per month for this working space to be connected to the electrical grid if you could space the payment out over six months?</p> <p>How much do you think it would cost to hire an electrician to do the internal electrical wiring?</p>	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>
3	<p>How much do you think you would need to spend on electricity each month?</p>	<ol style="list-style-type: none"> <li>1. Less than AFN 2000</li> <li>2. AFN 2000 - AFN 3000</li> <li>3. AFN 3000-AFN 4000</li> <li>4. AFN 4000-AFN 5000</li> <li>5. More than AFN 5000</li> </ol> <p>888. I don't know</p> <p>999. Refuse to answer</p>
4	<p>If offered a new Solar Home System (three lights, TV and fan) for rent (including all mant</p>	<ol style="list-style-type: none"> <li>1. Less than AFN 500</li> <li>2. AFN 500-AFN 1000</li> <li>3. AFN 1000-AFN 1500</li> <li>4. AFN 1500 -AFN 2000</li> <li>5. AFN 2000-AFN 2500</li> <li>6. AFN 2500-AFN 3000</li> <li>7. AFN 3000-AFN 3500</li> <li>8. AFN 3500-AFN 4000</li> <li>9. AFN 4000-AFN 4500</li> <li>10. AFN 4500 - AFN 5000</li> <li>11. More than AFN 5000</li> </ol> <p>888. I don't know</p> <p>999. Refuse to answer</p>
5	<p>If offered to buy a new Solar Home System (three lights, TV and fan) financed in 24 monthly installments, would you be willing/able to pay \$ per month for it over two years?</p>	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>
6	<p>If offered to buy a new Solar Lantern with mobile phone charging and 2 years warranty, would you be willing/able to pay AFS for this lighting source?</p>	<ol style="list-style-type: none"> <li>1. Yes</li> <li>2. No</li> </ol>



<b>COOKING AND HEATING</b>		
1	Does this business/institution regularly cook for staff or people who come to the workplace?	1. Yes 2. No
2	Please tell us the age and gender of all persons who regularly cook food here.	
3	What type of stove does your household use most of the time / as a primary stove?	1. Stone / fire stove 2. Other self-built stove 3. Manufactured electric stove 4. Manufactured kerosene stove 5. Manufactured gas stove 6. Manufactured biomass stove 777. Other (specify)  888. I don't know  999. Refuse to answer
4	What is the manufacturer and model of the main stove? please have a look at the stove to verify, if possible	_____ 888. I don't know  999. Refuse to answer
5	In the last 12 months, what are the fuels you used to power this cookstove?	1. Kerosene 2. Coal / lignite 3. Charcoal 4. Wood 5. Solar 6. Animal waste / dung 7. Crop residue / plant biomass 8. Saw dust 9. Coal briquette 10. Biomass briquette 11. Processed biomass (pellets) / woodchips 12. Ethanol 13. Biogas 14. LPG / cooking gas 15. Piped natural gas 16. Electric 17. Garbage / plastic 777. Other (specify)

		<p>888. I don't know</p> <p>999. Refuse to answer</p>
6	Do you usually use a chimney, hood or other exhaust system while cooking?	<p>1. Yes</p> <p>2. No</p>
7	What is the main method of heating this business/institution?	<p>1. No heating</p> <p>2. Bukhari</p> <p>3. Sandali</p> <p>4. Electric heater(s)</p> <p>5. Gas heater(s)</p> <p>6. Tandour oven</p> <p>7. Tabakhana</p> <p>777. Other (specify)</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
8	What are the fuels used for heating this household in the winter? Multiple answers	<p>1. Wood</p> <p>2. Wood chips</p> <p>3. Gas</p> <p>4. Electricity</p> <p>5. Crop residue</p> <p>6. Coal/charcoal</p> <p>7. Animal dung</p> <p>8. Mountain thorns/twigs/branches</p> <p>9. Bushes/straw/nut shells</p> <p>10. Rubbish, trash</p> <p>11. Rubber (shoes, tires...)</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
9	How much money did you spend on fuel for heating in the last month? Answer in Afghanis	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
10	In a typical week, how many total hours do people in this business / institute spend gathering fuel?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>

11	Please tell us the age, and gender, of all persons who regularly collect fuel for this business? Please list all individuals who collect fuel	
12	What is the frequency of collection of fuel?	1. Daily 2. Bi-weekly 3. Weekly 4. Monthly 888. I don't know 999. Refuse to answer
13	In the last 12 months, did anyone in your business/institute suffer any of these types of	1. Death or permanent damage 2. Burns/fire/poisoning 3. Severe cough/respiratory problems 4. Other major injury 5. Minor injury 6. Fire with no injury 7. Itchy/water eyes 8. Light cough 9. None 888. I don't know 999. Refuse to answer
PHOTOS		
1	Please take a photo of the generator.	
2	Please take a photo of the major energy uses for the business (equipment, tools, appliances).	
3	Please take a photo of the electricity meter.	
4	Please take a photo of the main solar device.	

5	Please take a picture of the space occupied by the business / institution.	
6	Please take a photo of the business / institution and surrounding dwellings / environment.	
This concludes our survey. Thank you very much for your time today. Please note that as agreed before the survey, we will call you again in a few weeks to ask you a few questions about your energy usage over the course of the previous week. That survey will be much shorter than this one!		

## TOOL 3. Energy Diary for Households

Enumerators are instructed to scan the QR code to the left of the respondent's entry. This looks up the respondent's baseline survey responses to province, location, language, first and last name, gender, alternate name, type of energy source, main lighting, main devices, and main and alternate phone number.

Hello, my name is.... I am calling from Samuel Hall. We did a survey with you or someone from your household about energy a few weeks ago. This is a short follow-up to that first round of questions – it should not take longer than fifteen minutes of your time. Do you agree to speak with us? Thank you so much for your time.

	Question	Answer
<b>IDENTIFICATION CHECK</b>		
1.	Please tell us your name. Enumerator checks that this person is either the main respondent or alternative respondent.	1. Yes <b>SKIP TO Q3</b> 2. No
2.	<b>If wrong respondent</b> Do you know if we can reach the main respondent or alternative respondent using this phone number? <b>Thank the person for his or her time and end the interview. Please alert your supervisor.</b>	1. Yes, you can try calling again later 2. No
3.	Can you confirm that you live/work in the [location] in [province]?	1. Yes 2. No
4.	<b>If right respondent but wrong location:</b> Where do you live? <b>Find out whether this person has moved, and since when. Ask if the person's entire household has left or just the respondent. Thank the person for his or her time and end</b>	

	the interview. Please alert your supervisor.	
<b>ENERGY USAGE</b>		
5.	If right respondent and right location:  What sources of energy does this household use?	<ol style="list-style-type: none"> <li>1. Grid</li> <li>2. Minigrid</li> <li>3. Generator</li> <li>4. Pico-Hydro</li> <li>5. Rechargeable batteries (not solar)</li> <li>6. Solar</li> <li>7. None of the above</li> </ol>
	Which is the primary / most important source of energy for this business / institution?	<ol style="list-style-type: none"> <li>1. Grid</li> <li>2. Minigrid</li> <li>3. Pico-Hydro</li> <li>4. Generator</li> <li>5. Rechargeable batteries (not solar)</li> <li>6. Solar</li> </ol>
	Among the things you just listed, is there any source of energy / electricity that you did not already have last month?	<ol style="list-style-type: none"> <li>1. No</li> <li>2. Yes, we now have grid (new)</li> <li>3. Yes, we now have minigrid (new)</li> <li>4. Yes, we now have pico-hydro energy (new)</li> <li>5. Yes, we now have a solar device (new)</li> <li>6. Yes, we now have a generator (new)</li> </ol>
<b>INCOME SPENDING</b>		
1	Could you please provide an estimate of your households's total revenue over the past week/ month? (in AFN)	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
2	Enumerator: Was this amount given for a week or for a month?	<ol style="list-style-type: none"> <li>1. Week</li> <li>2. Month</li> </ol>
3	Could you please provide an estimate of your business / institution's total spending over the past week? (in AFN)	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
	How much did your household spend on food over the past week	<p>_____</p> <p>888. I don't know</p>

		999. Refuse to answer
<b>GRID</b>		
	Do you remember your most recent electricity bill, or can you consult it right now?	1. Yes 2. No
	How much were you charged for the most recent billing period of electricity on your bill? (in AFN)	_____ 888. I don't know 999. Refuse to answer
	Over this period, how much electricity did your place of work use, as per your bill? (in kWh)	_____ 888. I don't know 999. Refuse to answer
	How many electricity outages (longer than a minute) occurred in the past week?	_____ 888. I don't know 999. Refuse to answer
<b>MINI-GRID</b>		
	Do you remember your most recent minigrid electricity bill, or can you consult it right now?	1. Yes 2. No
	What period does your latest electricity bill cover?	1. One month 2. Two months 777. Other (specify) 888. I don't know 999. Refuse to answer
	How much were you charged for the most recent billing period of electricity on your bill? (in AFN)	_____ 888. I don't know 999. Refuse to answer

	Over this period, how much electricity did your place of work use? (in kWh)	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
	How many electricity outages (longer than one minute) occurred in the past week?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
<b>PICO-HYDRO</b>		
	Do you remember your latest electricity bill, or can you consult it right now?	<p>1. Yes</p> <p>2. No</p>
	How much were you charged for the most recent billing period of electricity on your bill? (in AFN)	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
	Over this period, how much electricity did your place of work use? (in kWh)	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
	How many electricity outages (longer than one minute) occurred in the past week?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
<b>GENERATOR</b>		
	Have you acquired your generator over the course of the past month?	<p>1. Yes</p> <p>2. No</p>
	What is the capacity of your new generator? (in kW)	<p>_____</p> <p>888. I don't know</p>



		999. Refuse to answer
	Did your household buy this new generator, is it rented, or are you using it for free?	1. Bought 2. Rented 3. Used for free 888. I don't know 999. Refuse to answer
	How much did this generator cost? (AFN)	_____ 888. I don't know 999. Refuse to answer
	How much does your household pay every month to use this generator? (in AFN)	_____ 888. I don't know 999. Refuse to answer
	In the past week, what was the total quantity of fuel used to power the generator? (in litres)	_____ 888. I don't know 999. Refuse to answer
	In the last week, how much did your household spend on fuel for this generator? (in AFN)	_____ 888. I don't know 999. Refuse to answer
	In the last month, how much did your household pay for repairs/parts /maintenance of the generator?	_____ 888. I don't know 999. Refuse to answer
<b>BATTERIES</b>		
	What did you use rechargeable batteries for in the past week?	1. Lighting 2. Tools 777. Other (specify)

	How much did you spend to recharge batteries in the past week? (in AFN)	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
	How many hours did you use rechargeable batteries per day (24 hours) on average over the past week?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
<b>SOLAR</b>		
	Have you acquired a new solar device over the course of the past month?	<p>1. No, no changes</p> <p>2. No, but I added a new panel</p> <p>3. Yes</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
	How much did this new panel cost? (AFN)	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
	How much did you pay to have this new panel installed? (AFN)	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
	What kind of solar device have you recently acquired?	
	What is the capacity of this new solar device? (in ampère-hours)	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
	Did you buy this new solar device, rent it, or are you using it for free?	<p>1. Bought</p> <p>2. Rented</p> <p>3. Used for free</p> <p>777. Other (specify)</p>

		888. I don't know 999. Refuse to answer
	How much did you pay for this new solar device? (in AFN)	_____ 888. I don't know 999. Refuse to answer
	How much do you pay, per month, to use this solar device? (in AFN)	_____ 888. I don't know 999. Refuse to answer
	How many hours of service were available from the main solar device on an average day in the past week?	_____ 888. I don't know 999. Refuse to answer
	How much did your household spend on repair / upkeep/ maintenance of your main solar device in the past month? (in AFN)	_____ 888. I don't know 999. Refuse to answer
<b>TOOLS AND DEVICES</b>		
	When we interviewed your household in the spring, we learned that you had a fridge. Do you still have this fridge, and is it in use all day every day?	1. We no longer have / use this fridge 2. We have the fridge but it is not always on 3. We have the fridge and it is always on 4. We never had a fridge 888. I don't know 999. Refuse to answer
	When we interviewed your household in the spring, we learned that you had a radio. Could you tell me how many hours you have used this radio on an average day in the past week?	_____ 888. I don't know 999. Refuse to answer

	When we interviewed your household in the spring, we learned that you had a TV. Could you tell me how many hours you have used that TV on an average day in the past week?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
	When we interviewed your household in the spring, we learned that you had a VCR/DVD. Could you tell me how many hours you have used that VCR/DVD on an average day in the past week?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
	When we interviewed your household in the spring, we learned that you had a computer. Could you tell me how many hours you have used that computer on an average day in the past week?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
	When we interviewed your household in the spring, we learned that you had an electric fan. Could you tell me how many hours you have used that electric fan on an average day in the past week?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
	Did you acquire any additional pieces of equipment / tool / machinery that is central to your business and that uses energy (electricity or fuel)?	<p>1. Yes</p> <p>2. No</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
	What did you acquire?	
<b>COOKING AND HEATING</b>		

	Have you acquired a new main cookstove over the course of the past month?	1. Yes 2. No 888. I don't know 999. Refuse to answer
	What type of cookstove is now your main stove?	1. Manufactured biomass stove 2. Manufactured gas stove 3. Other self-built stove 4. Stone / fire stove 777. Other (specify)
	What fuel(s) did your household use for cooking over the past week?	1. Animal waste / dung 2. LPG / cooking gas 3. Piped natural gas 4. Wood 5. Twigs, straw, thorns 6. Coal 777. Other (specify) 888. I don't know 999. Refuse to answer
	What fuel did your household use for heating over the past week?	1. None 2. Animal waste / dung 3. LPG / cooking gas 4. Piped natural gas 5. Wood 6. Twigs, straw, thorns 7. Coal 777. Other (specify) 888. I don't know 999. Refuse to answer
	How much did your household spend on fuel for cooking over the past week? (in AFN)	_____ 888. I don't know 999. Refuse to answer
	How much did your household spend on fuel for heating over the past week? (in AFN)	_____ 888. I don't know 999. Refuse to answer

	How much time did members of your household spend collecting fuel for cooking / heating over the past week? (in hours)	_____ 888. I don't know 999. Refuse to answer
	How many ser of wood did you use in the past week?	_____ 888. I don't know 999. Refuse to answer
	How many ser of coal did you use in the past week?	_____ 888. I don't know 999. Refuse to answer
<b>LIGHTING</b>		
	Have you acquired any new lighting solutions (lamps, candles, torches...) in the past month?	1. Yes 2. No 888. I don't know 999. Refuse to answer
	What did you acquire?	1. Lamp connected to electricity (plug) 2. Solar lamp 3. Candles 4. Dry-cell torch 5. Fuel-based lamp 6. Gas lamp 777. Other (specify)
	How much did you spend on the new lighting solution(s)? (in AFN)	_____ 888. I don't know 999. Refuse to answer
	How many lamps / lights / do you use in your house on a regular basis?	_____ 888. I don't know 999. Refuse to answer

	How much did your household spend on lighting in the past week? For instance, candles, fuel or gas, batteries? (in AFN)	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
	How many hours did you use lights, on an average day and night (24 hours), over the past week?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
<b>WILLINGNESS TO PAY</b>		
	Would you be willing / able to pay XXX for your house to be connected to the electrical grid tomorrow, if it were possible?	<p>1. Yes</p> <p>2. No</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
	Would you be willing / able to pay XXX for your place of work to be connected to the electrical grid if you could space the payment out over six months?	<p>1. Yes</p> <p>2. No</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
	If offered a new Solar Home System (three lights, TV and fan) for rent (including all maintenance), would you be willing / able to pay XXX per month for this?	<p>1. Yes</p> <p>2. No</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
	If offered to buy a new Solar Home System (three lights, TV and fan) financed in 24 monthly installments, would you be willing / able to pay XXX per month for his? <b>Enumerator: Please specify that this means that after 24 months the SHS would belong to the respondent's place of work</b>	<p>1. Yes</p> <p>2. No</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>

	If offered to buy a new solar lantern with mobile phone charging and two years warranty, would you be willing / able to pay <b>XXX</b> for this?	1. Yes 2. No 888. I don't know 999. Refuse to answer
<b>FOLLOWUP</b>		
	This concludes our survey. Thank you so much for your time today.	
	May we call you again with this brief survey next month?	1. Yes 2. No
	Will we be able to reach you using this same phone number?	1. Yes 2. No
	What phone number will we be able to reach you under?	_____ 888. I don't know 999. Refuse to answer



## TOOL 4. Energy Diary for Enterprises

Enumerators are instructed to scan the QR code to the left of the respondent's entry. This looks up the respondent's baseline survey responses to province, location, language, first and last name, gender, alternate name, type of energy source, main lighting, main devices, and main and alternate phone number.

Hello, my name is.... I am calling from Samuel Hall. We did a survey with you or someone from your place of work about energy a few weeks ago. This is a short follow-up to that first round of questions – it should not take longer than fifteen minutes of your time. Do you agree to speak with us? Thank you so much for your time.

	Question	Answer
<b>IDENTIFICATION CHECK</b>		
1.	Please tell us your name.  <b>Enumerator checks that this person is either the main respondent or alternative respondent.</b>	1. Yes <b>SKIP TO Q3</b> 2. No
2.	<b>If wrong respondent</b>  Do you know if we can reach the main respondent or alternative respondent using this phone number? <b>Thank the person for his or her time and end the interview. Please alert your supervisor.</b>	1. Yes, you can try calling again later 2. No
3.	Can you confirm that you live/work in the [location] in [province]?	1. Yes 2. No
4.	<b>If right respondent but wrong location:</b>  Where do you live? <b>Find out whether this person has moved, and since when. Ask if the person's entire household has left or just the respondent. Thank the person for his or her time and end</b>	

	the interview. Please alert your supervisor.	
<b>ENERGY USAGE</b>		
5.	If right respondent and right location:  What sources of energy does this business / institution use?	<ol style="list-style-type: none"> <li>1. Grid</li> <li>2. Minigrid</li> <li>3. Generator</li> <li>4. Pico-Hydro</li> <li>5. Rechargeable batteries (not solar)</li> <li>6. Solar</li> <li>7. None of the above</li> </ol>
	Which is the primary / most important source of energy for this business / institution?	<ol style="list-style-type: none"> <li>1. Grid</li> <li>2. Minigrid</li> <li>3. Pico-Hydro</li> <li>4. Generator</li> <li>5. Rechargeable batteries (not solar)</li> <li>6. Solar</li> </ol>
	Among the things you just listed, is there any source of energy / electricity that you did not already have last month?	<ol style="list-style-type: none"> <li>1. No</li> <li>2. Yes, we now have grid (new)</li> <li>3. Yes, we now have minigrid (new)</li> <li>4. Yes, we now have pico-hydro energy (new)</li> <li>5. Yes, we now have a solar device (new)</li> <li>6. Yes, we now have a generator (new)</li> </ol>
<b>INCOME</b>		
1	Could you please provide an estimate of your business / institution's total revenue over the past week/ month? (in AFN)	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
2	Enumerator: Was this amount given for a week or for a month?	<ol style="list-style-type: none"> <li>1. Week</li> <li>2. Month</li> </ol>
3	Could you please provide an estimate of your business / institution's total expenditure over the past week / month? (in AFN)	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
4	Enumerator: Was this amount given for a week or for a month?	<ol style="list-style-type: none"> <li>1. Week</li> <li>2. Month</li> </ol>

	How much did your business / community institution spend on wages over the past week / month?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
	Was this amount given for a week or for a month?	<p>1. Week</p> <p>2. Month</p>
<b>GRID</b>		
	Do you remember your most recent electricity bill, or can you consult it right now?	<p>3. Yes</p> <p>4. No</p>
	How much were you charged for the most recent billing period of electricity on your bill? (in AFN)	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
	Over this period, how much electricity did your place of work use, as per your bill? (in kWh)	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
	How many electricity outages (longer than a minute) occurred in the past week?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
<b>MINI-GRID</b>		
	Do you remember your most recent minigrid electricity bill, or can you consult it right now?	<p>1. Yes</p> <p>2. No</p>
	What period does your latest electricity bill cover?	<p>1. One month</p> <p>2. Two months</p> <p>777. Other (specify)</p> <p>888. I don't know</p>

		999. Refuse to answer
	How much were you charged for the most recent billing period of electricity on your bill? (in AFN)	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
	Over this period, how much electricity did your place of work use? (in kWh)	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
	How many electricity outages (longer than one minute) occurred in the past week?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
<b>PICO-HYDRO</b>		
	Do you remember your latest electricity bill, or can you consult it right now?	<p>1. Yes</p> <p>2. No</p>
	How much were you charged for the most recent billing period of electricity on your bill? (in AFN)	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
	Over this period, how much electricity did your place of work use? (in kWh)	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
	How many electricity outages (longer than one minute) occurred in the past week?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>

GENERATOR		
	Have you acquired your generator over the course of the past month?	1. Yes 2. No
	What is the capacity of your new generator? (in kW)	_____ 888. I don't know 999. Refuse to answer
	Did your place of work buy this new generator, is it rented, or are you using it for free?	1. Bought 2. Rented 3. Used for free 888. I don't know 999. Refuse to answer
	How much did this generator cost? (AFN)	_____ 888. I don't know 999. Refuse to answer
	How much does this business / institution pay every month to use this generator? (in AFN)	_____ 888. I don't know 999. Refuse to answer
	In the past week, what was the total quantity of fuel used to power the generator? (in litres)	_____ 888. I don't know 999. Refuse to answer
	In the past week, what was the total quantity of fuel used to power the generator? (in litres)	_____ 888. I don't know 999. Refuse to answer
	In the last month, how much did your business / institution pay for	_____ 888. I don't know

	repairs/parts /maintenance of the generator?	999. Refuse to answer
<b>BATTERIES</b>		
	What did you use rechargeable batteries for in the past week?	1. Lighting 2. Tools 777. Other <b>(specify)</b>
	How much did you spend to recharge batteries in the past week? (in AFN)	_____ 888. I don't know 999. Refuse to answer
	How many hours did you use rechargeable batteries per day (24 hours) on average over the past week?	_____ 888. I don't know 999. Refuse to answer
<b>SOLAR</b>		
	Have you (i.e. your business / institution) acquired a new solar device over the course of the past month?	1. No, no changes 2. No, but I added a new panel 3. Yes 888. I don't know 999. Refuse to answer
	How much did this new panel cost? (AFN)	_____ 888. I don't know 999. Refuse to answer
	How much did you pay to have this new panel installed? (AFN)	_____ 888. I don't know 999. Refuse to answer
	What kind of solar device have you recently acquired?	

	What is the capacity of this new solar device? (in ampère-hours)	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
	Did you buy this new solar device, rent it, or are you using it for free?	<p>1. Bought</p> <p>2. Rented</p> <p>3. Used for free</p> <p>777. Other (specify)</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
	How much did you pay for this new solar device? (in AFN)	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
	How much do you pay, per month, to use this solar device? (in AFN)	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
	How many hours of service were available from the main solar device on an average day in the past week?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
	How much did your place of work spend on repair / upkeep/ maintenance of your main solar device in the past month? (in AFN)	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
<b>TOOLS AND DEVICES</b>		
	When we interviewed you / a representative from your business / institution in the spring, we learned that \${main_device} was an important user of energy at	<p>1. We no longer have / use this device.</p> <p>2. Yes</p> <p>3. We never used this device.</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>

	your place of work. Is this still the case today?	
	For how many hours was this device in use on an average day in the past week?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
	When we interviewed you / a representative from your business / institution in the spring, we learned that <span style="color: red;">\${second_device}</span> was another important user of energy at your place of work. Is this still the case today?	<p>1. We no longer have / use this device.</p> <p>2. Yes</p> <p>3. We never used this device.</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
	For how many hours was this device in use on an average day in the past week?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
	When we interviewed you / a representative from your business / institution in the spring, we learned that <span style="color: red;">\${third_device}</span> was an important user of energy at your place of work. Is this still the case today?	<p>1. We no longer have / use this device.</p> <p>2. Yes</p> <p>3. We never used this device.</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
	For how many hours was this device in use on an average day in the past week?	<p>_____</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>
	Did you acquire any additional pieces of equipment / tool / machinery that is central to your business and that uses energy (electricity or fuel)?	<p>1. Yes</p> <p>2. No</p> <p>888. I don't know</p> <p>999. Refuse to answer</p>



	What did you acquire?	
	How is this device powered?	1. Fuel 2. Electricity 888. I don't know 999. Refuse to answer
	For how many hours was this device in use on an average day in the past week?	_____ 888. I don't know 999. Refuse to answer
<b>WILLINGNESS TO PAY</b>		
	Would you be willing / able to pay XXX for your place of work to be connected to the electrical grid tomorrow, if it were possible?	1. Yes 2. No 888. I don't know 999. Refuse to answer
	Would you be willing / able to pay XXX for your place of work to be connected to the electrical grid if you could space the payment out over six months?	1. Yes 2. No 888. I don't know 999. Refuse to answer
	If offered a new Solar Home System (three lights, TV and fan) for rent (including all maintenance), would you be willing / able to pay XXX per month for this?	1. Yes 2. No 888. I don't know 999. Refuse to answer
	If offered to buy a new Solar Home System (three lights, TV and fan) financed in 24 monthly installments, would you be willing / able to pay XXX per month for his? <b>Enumerator: Please specify that this means that after 24</b>	1. Yes 2. No 888. I don't know 999. Refuse to answer

	months the SHS would belong to the respondent's place of work	
	If offered to buy a new solar lantern with mobile phone charging and two years warranty, would you be willing / able to pay <b>XXX</b> for this?	1. Yes 2. No 888. I don't know 999. Refuse to answer
<b>FOLLOWUP</b>		
	This concludes our survey. Thank you so much for your time today.	
	May we call you again with this brief survey next month?	1. Yes 2. No
	Will we be able to reach you using this same phone number?	1. Yes 2. No
	What phone number will we be able to reach you under?	_____ 888. I don't know 999. Refuse to answer

## Annex 6: Selected Bibliography

- ADB (2006). Country synthesis report on urban air quality management. The Philippines: Asian Development Bank and the Clean Air Initiative for Asian Cities (CAI-Asia) Center.
- Agha Mohammad et al, Urban residential energy use in Kandahar, Afghanistan. *Cieies*, Volume 32, June 2013.
- Akil Y. and Miyauchi H., "Seasonal Regression Models for Electricity Consumption Characteristics Analysis," *Engineering*, Vol. 5 No. 1B, 2013, pp. 108-114. doi: [10.4236/eng.2013.51B020](https://doi.org/10.4236/eng.2013.51B020).
- Barnes, D. F., Krutilla, K., & Hyde, W. (2004). The urban household energy transition. Energy, poverty, and the environment in the developing world.
- Bhatia M., and Angelou N., 2015, World Bank, *Beyond Connections: Energy Access Redefined (Conceptualization Report)*
- R. K. Burns, "Afghanistan: solar assets, electricity production, and rural energy factors," *Renewable and Sustainable Energy Reviews*, vol. 15, no. 4, pp. 2144–2148, 2011.
- CIA, The World Fact Book: Afghanistan Economy. Retrieved from Central Intelligence Agency (CIA), March 2014, [https:// www.cia.gov/library/publications/the-world-factbook/geos/af .html](https://www.cia.gov/library/publications/the-world-factbook/geos/af.html).
- CSO, National Risk and Vulnerability Assessment (NRVL) 2011- 2012, CSO, Kabul, Afghanistan, 2014.
- CSO, Population Statistics, Central Statistics Organization, Kabul, Afghanistan, 2014, <http://cso.gov.af>.
- CSO, Economy Statistics: Mining and Energy. Retrieved from Central Statistics Organization (CSO), April 2015, <http://cso.gov.af/>.
- Devicienti F., Klytchnikova I. and Paternostro S., 2004, Willingness to pay for water and energy: an introductory guide to contingent valuation and coping cost techniques, *World Bank*
- Dowdy J and Erdmann E, 2013, After the "War Economy": The Role of the Private Sector in Afghanistan's Future (Chapter 14) in Richards C and Stewart J (compilers), *Afghanistan Revealed: Beyond the Headlines*
- Fichtner, Islamic Republic of Afghanistan: Power Sector Master Plan, Fichtner, Stuttgart, Germany, 2013.
- Fruh N., 2015, Energy Saving Solutions Catalog for Kabul Households, *GERES*
- GERES, 2015, Final Evaluation: Passive Solar Houses in Afghanistan
- GERES, 2010, Introduction of Energy Efficiency in Public Buildings in Afghanistan
- Groh S., Pauchari S. and Rao N. D., 'What are we measuring? An Empirical Analysis of household electricity access metrics in rural Bangladesh,' *Energy for Sustainable Development*, February 2016
- Harakat, 2011, *Informality and Small Business Development in the City of Kabul*
- M. Hallett, "Distributed power in afghanistan: the padisaw micro-hydro project," *Renewable Energy*, vol. 34, no. 12, pp. 2847–2851, 2009.

ICE, Energy Sector Status Summary Report, The Inter-Ministerial Commission for Energy Secretariat, Kabul, Afghanistan, 2016.

Kaygusuz, K. (2012). Energy for sustainable development: A case of developing countries. *Renewable and Sustainable Energy Reviews*, 16, 1116–1126

Kowsari, R., & Zerriffi, H. (2011). Three dimensional energy profile: A conceptual framework for assessing household energy use. *Energy Policy*, 39, 7505–7517

Lam J. C., “Climatic and Economic Influences on Residential Electricity Consumption,” *Energy Convers. Mgmt*, Vol. 39, No. 7, 1998, pp. 623-629. doi: 10.1016/S0196-8904(97)10008-5

Lam J., Tang H. and Danny L., 2008, Seasonal variations in residential and commercial sector electricity consumption in Hong Kong, *Energy*, Vol 33, Issue 3, pages 513-523

E. Martinot, A. Chaurey, D. Lew, J. R. Moreira, and N. Wamukonya, “Renewable energy markets in developing countries,” *Annual Review of Energy and the Environment*, vol. 27, pp. 309–348, 2002.

Ministry of Finance (2010). Afghanistan millennium development goals report 2010. Islamic Republic of Afghanistan.

Milbrandt, A., & Overend, R., (2011). Assessment of biomass resources in Afghanistan. United States: National Renewable Energy Laboratory. United States Department of Energy. Office of Scientific and Technical information

Misra, S., 2008, Willingness of households to pay for improved services and affordability, *World Bank*

Mirasgedis S., Sarafidis Y., Georgopoulou E., Lalas D. P., Moschovits M, Karagiannis F. and Papakonstantinou D., “Models for Mid-Term Electricity Demand Forecasting Incorporating Weather Influences,” *Energy*, Vol. 31, 2006, pp. 208-227. doi: 10.1016/j.energy.2005.02.016

Pardo A., Meneu V. and Valor E., “Temperature and Seasonality Influences on Spanish Electricity Load,” *Energy Economics*, Vol. 24, 2002, pp. 55-70. doi: 10.1016/S0140-9883(01)00082-2

Permana, A. S., Perera, R., & Kumar, S. (2008). Understanding energy consumption pattern of households in different urban development forms: A comparative study in Bandung City, Indonesia. *Energy Policy*, 36, 4287–4297

Reddy, B.S. (2004). Economic and social dimensions of household energy use: A case study of India. In E. Ortega & S. Ulgiati (Eds.), *Proceedings of IV biennial international workshop “Advances in energy studies”* (pp. 469–477), June 16–19, Unicamp, Campinas, SP, Brazil.

B. Spagnoletti and T. O’Callaghan, “Let there be light: a multiactor approach to alleviating energy poverty in Asia,” *Energy Policy*, vol. 63, pp. 738–746, 2013.

Tetra Tech, Development of Wind Energy Meteorology and Engineering for Siting and Design of Wind Energy Projects in Afghanistan, Tetra Tech, Langhorne, Pa, USA, 2009.

Wangpattarapong K., Maneewan S., Ketjoy N. and Rakwichian W., “The Impacts of Climatic and Economic Factors on Residential Electricity Consumption of Bangkok Metropolis,” *Energy and Buildings*, Vol. 40, 2008, pp. 1419-1425. doi: 10.1016/j.enbuild.2008.01.006

World Bank, 2016, Energy Security Trade-Offs under High Uncertainty: Resolving Afghanistan's Power Sector Development Dilemma

World Bank, 2015, *World Development Report*

World Bank (2012a). Interim strategy note for Islamic Republic of Afghanistan for the period FY12-FY14. National Development Association and Interim Finance Corporation Interim Strategy.